

Document of  
**The World Bank**  
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Report No: PAD2659

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED IDA GRANT

IN THE AMOUNT OF SDR 10.5 MILLION (US\$15 MILLION EQUIVALENT)

TO THE

INTERNATIONAL CENTRE OF INSECT PHYSIOLOGY AND ECOLOGY

FOR THE

AFRICA REGIONAL SCHOLARSHIP AND INNOVATION FUND FOR APPLIED SCIENCES,  
ENGINEERING AND TECHNOLOGY PROJECT IN SUB-SAHARAN AFRICA

May 31, 2018

Education Global Practice  
Africa Region

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2018)

Currency Unit = US\$

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US\$ 1.438 = SDR 1

## FISCAL YEAR

January 1 - December 31

Regional Vice President: Makhtar Diop

Country Director: Paul Nouamba Um

Senior Global Practice Director: Jaime Saavedra Chanduvi

Practice Manager: Sajitha Bashir

Task Team Leader(s): Javier Botero Alvarez and Huma Ali Waheed

## ABBREVIATIONS AND ACRONYMS

AAU	Association of African Universities
ACE	Africa Centers of Excellence
AfDB	African Development Bank
AGRA	Building an Alliance for a Green Revolution
AI	Artificial Intelligence
ASET	Applied Sciences, Engineering and Technology
AWARD	African Woman in Agriculture Research and Development
BMZ	Federal Ministry of Economic Cooperation and Development of Germany
CAG	Consultative Advisory Group
CARI	Consortium for African Research and Innovation
CARTA	Consortium for Advanced Research Training in Africa
CCBAD	Climate Change Biodiversity and Sustainable Agriculture
COMESA	Common Market for Eastern and Southern African Countries
DAAD	German Academic Exchange Service
DFG	German Research Foundation
EAC	East African Community
EC	Executive Committee
ECOWAS	Economic Community of West African States
ERP	Enterprise Resource Planning
ESMP	Environment and Social Management Plan
FDI	Foreign Direct Investment
FM	Financial Management
GDP	Gross Domestic Product
GRS	Grievance Redressal System
IBRD	International Bank for Reconstruction and Development
icipe	International Centre of Insect Physiology and Ecology
ICT	Information, communication and technology
IDA	International Development Association
IIE	Institute of International Education
IP	Intellectual Property
IRD	French Research Institute for Development
IRR	Internal Rates of Return
IT	Information Technology
KIST	Korea Institute of Science and Technology
MoU	Memorandum of Understanding
NPF	New Procurement Framework
PASET	Partnership for skills in Applied Sciences, Engineering and Technology
PDO	Project Development Objective
PPSD	Project Procurement Strategy Document
R&D	Research and Development
RCU	Regional Coordination Unit
RISE	Regional Initiative in Science and Education
RSIF	Regional Scholarship and Innovation Fund

SADC	Southern African Development Community
SBD	Standard Bidding Document
SDC	Swiss Agency for Development and Cooperation
Sida	Swedish International Development Cooperation Agency
SRFP	Standard Request for Proposal
SSA	Sub-Saharan Africa
STEP	Systematic Tracking of Exchanges in Procurement
STI	Science, Technology and Innovation
STISA	Science, Technology and Innovation Strategy for Africa
UK	United Kingdom
WBG	World Bank Group

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**BASIC INFORMATION**

Country(ies)	Project Name	
Africa	Africa Regional Scholarship and Innovation Fund for Applied Sciences, Engineering and Technology	
Project ID	Financing Instrument	Environmental Assessment Category
P165581	Investment Project Financing	C-Not Required

**Financing & Implementation Modalities**

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Disbursement-linked Indicators (DLIs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
21-Jun-2018	30-Jun-2024

Bank/IFC Collaboration

No

**Proposed Development Objective(s)**

To strengthen the institutional capacity for quality and sustainable doctoral training, research and innovation in transformative technologies in sub-Saharan Africa.

**Components**

Component Name	Cost (US\$, millions)
Component 1: Capacity Development for the operation and management of the Scholarship, Research and Innovation Fund	15.00
Component 2: Scholarships and research grants for ASET	9.00

### Organizations

Borrower: International Centre of Insect Physiology and Ecology

Implementing Agency: International Centre of Insect Physiology and Ecology

### PROJECT FINANCING DATA (US\$, Millions)

#### SUMMARY

<b>Total Project Cost</b>	24.00
<b>Total Financing</b>	24.00
<b>of which IBRD/IDA</b>	15.00
<b>Financing Gap</b>	0.00

#### DETAILS

##### World Bank Group Financing

International Development Association (IDA)	15.00
IDA Grant	15.00

##### Non-World Bank Group Financing

Trust Funds	9.00
Single Purpose Trust Fund	9.00

#### IDA Resources (in US\$, Millions)

	Credit Amount	Grant Amount	Total Amount
Regional	0.00	15.00	15.00
<b>Total</b>	<b>0.00</b>	<b>15.00</b>	<b>15.00</b>

**Expected Disbursements (in US\$, Millions)**

WB Fiscal Year	2018	2019	2020	2021	2022	2023	2024
Annual	0.00	7.00	8.00	3.50	4.00	1.50	0.00
Cumulative	0.00	7.00	15.00	18.50	22.50	24.00	24.00

**INSTITUTIONAL DATA**

**Practice Area (Lead)**

Education

**Contributing Practice Areas**

**Climate Change and Disaster Screening**

This operation has been screened for short and long-term climate change and disaster risks

**Gender Tag**

**Does the project plan to undertake any of the following?**

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF	Yes
b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment	Yes
c. Include Indicators in results framework to monitor outcomes from actions identified in (b)	Yes

**SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)**

Risk Category	Rating
1. Political and Governance	● Moderate
2. Macroeconomic	● Substantial
3. Sector Strategies and Policies	● Moderate
4. Technical Design of Project or Program	● Substantial
5. Institutional Capacity for Implementation and Sustainability	● Substantial

6. Fiduciary	● Substantial
7. Environment and Social	● Low
8. Stakeholders	● Moderate
9. Other	
10. Overall	● Substantial

## COMPLIANCE

### Policy

Does the project depart from the CPF in content or in other significant respects?

Yes  No

Does the project require any waivers of Bank policies?

Yes  No

### Safeguard Policies Triggered by the Project

	Yes	No
Environmental Assessment OP/BP 4.01		✓
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04		✓
Forests OP/BP 4.36		✓
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11		✓
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12		✓
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50		✓
Projects in Disputed Areas OP/BP 7.60		✓

### Legal Covenants

### Conditions



Type	Description
Disbursement	<p>Schedule 2, Section III.B.1 (b)</p> <p>Withdrawal of the funds allocated to Category 2 (Pilot Research and Innovation Grants under Part A.2(e) and A.4(e) of the Project):</p> <p>Notwithstanding the provisions of Schedule 2, Part A of the Financing Agreement, no withdrawal for pilot Research Grants, and Innovation Grants under Category (2) shall be made until the Co-financing Agreement has been executed and delivered and all conditions precedent to its effectiveness or to the right of the Recipient to make withdrawals under it have been fulfilled.</p>

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AFRICA REGIONAL SCHOLARSHIP AND INNOVATION FUND FOR APPLIED SCIENCES, ENGINEERING AND TECHNOLOGY

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## I. STRATEGIC CONTEXT

### A. Regional Context

1. **Diversification of the economic structure and across-the-board productivity improvements are necessary to enhance and sustain GDP growth in Sub-Saharan African (SSA) and make it inclusive and poverty-reducing.** In particular, the non-agricultural sectors are expected to grow and contribute to export diversification and structural transformation. While improvement in the business environment is critical for the private sector, at the firm level, the use of new technology and modern management practices is associated with greater export orientation, introduction of innovations in products or processes and higher productivity. At the same time, resilience to climate variability and change is vital to the region's ability to reduce poverty and protect the development progress made in recent decades.

2. **Rapid advances in technology, particularly transformative technologies that could have far reaching impact on society and the productive sector, constitute both an opportunity and a challenge for African societies.**<sup>1</sup> On the one hand, these advancements, sometimes called the "Fourth Industrial Revolution," which is characterized by an amalgamation of rapidly evolving technologies such as 3D printers, internet of things and artificial intelligence (AI) that cut across the physical, digital and biological spaces, could dramatically improve productivity in many sectors, such as food, energy, transport and other infrastructure and health. They offer the potential to respond to Africa's specific challenges, provided it is geared towards facilitating the application of technological solutions on a large scale and is supported by financing. For instance, 3D printing will enable fast designing and prototyping and producing prefabricated and standardized components for rapid and low cost construction,<sup>2</sup> while Internet of things, autonomous vehicle and drones, AI and machine learning, robotics, and digital traceability will affect the value chain of retail sectors by enabling individualized shopping experiences, reducing operating and transportation costs, increasing traceability and accountability, enabling real time and customized manufacturing and secured online transactions and record keeping using blockchain technologies.<sup>3</sup> On the other hand, the inability to prepare high level professionals to generate and adopt new technologies and remain competitive can lead to job losses even in the currently small formal sector and relegate millions of new and existing job seekers to low productivity jobs, widening income disparities.

3. **SSA's stock of skilled human capital is very limited and of poor quality, and the absence of a critical mass of applied scientists, engineers and technologists can constrain the expansion of industries, the emergence of new sectors and the adoption of innovations.** While an improved business environment and

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<sup>1</sup> Transformative technologies refer to those technologies that have far reaching impact to society such as artificial intelligence, precision agriculture, highly efficient energy systems, big data, smart materials, genomics and bioinformatic and other biotechnologies. McKinsey in 2013 estimates that Internet's transformative impact in Africa in six sectors including finance, education, health, retail, agriculture and government are expected to reach \$148 billion to \$318 billion by 2025. Examples include mobile money and banking, e-books and educational contents delivery through tablet, remote diagnostics, treatment and health education, e-commerce, information provision on weather, crop selection, pest control and financial management in agriculture sector. McKinsey & Company (2013), "Lions go digital: The Internet's transformative potential in Africa."

<sup>2</sup> World Economic Forum (2016), "Shaping the Future of Construction: A Breakthrough in Mindset and Technology."

<sup>3</sup> World Economic Forum (2017), "Shaping the Future of Retail for Consumer Industries."

other supportive measures are required, the growth of firms and diversification of manufacturing and services will depend critically on access to skilled labor, which can influence productivity growth through innovation and integration into regional and global markets. Recent analysis of the use of professional services (such as engineering, architectural, legal and accounting) in several countries, using a survey of firms in the Common Market for Eastern and Southern African (COMESA) countries (which include 19 SSA countries) and Enterprise Skills Surveys for Tanzania and Zambia, show that this unambiguously increases firm-level productivity.<sup>4 5 6</sup> This gap of highly skilled professionals is often filled by expatriate workers.<sup>7</sup> Moreover, with the onset of the Fourth Industrial Revolution, the demand for skills is changing and the jobs on the continent will require digital literacy and advanced knowledge in applied sciences, engineering and technology (ASET) areas.

**4. SSA has just 1.1 percent of the scientific researchers in the world, with less than 92 scientific researchers per million inhabitants compared to an average of 1083 for the world.**<sup>8</sup> Not only does this impact industry and hinder the growth of firms across sectors, it also contributes to a shortage of qualified faculty in African universities, especially in ASET fields, which in turn affects the quality of graduates. Expenditure on R&D across the region is low (0.41 percent of GDP) and only 1.4 percent of global scientific publications originate in SSA. Further, SSA – barring South Africa – is not seen by multinationals as a destination for undertaking research. This is reflected in the choice of Africa as a destination for a mere 0.8 percent of R&D-related projects financed through foreign direct investment (FDI) compared to 28.7 percent for China and India. The growth of such “research clusters” is known to increase innovation through the diffusion of technology in new firms. As of 2013, only 233 patents (0.1 percent of global share) were submitted by SSA researchers compared to 848 by India and 1,757 by China.

**5. Women continue to be under-represented in science and technological fields in SSA though there have been some gains in recent years.** There is a gender imbalance at all levels of education in the region, including tertiary education, with participation rates of women in tertiary education only at 31 percent in Ethiopia, 30 percent in Guinea, and 28 percent in Niger.<sup>9</sup> Women form less than 30 percent of the tertiary education graduates in scientific fields in Ghana, Uganda and Swaziland, and between 35-40 percent in Angola, Madagascar and Rwanda. While women dominate health and life sciences-related fields, less than 20 percent of female graduates are in engineering. In addition, among the scientific researchers on the continent, only 30 percent are women.<sup>10</sup> Women in SSA and across the globe have less access to research funding compared to their male counterparts.

**6. Innovative high growth entrepreneurs for most SSA countries remain below the expected level from countries with similar R&D incentives.**<sup>11</sup> This is mainly due to a lack of R&D facilities, quality entrepreneurship

<sup>4</sup> Tan, Hong (2017), “Migration and Labor Mobility in Sub-Saharan Africa: Recent Trends in EAC, ECOWAS and SADC”, Note prepared for Global Education Practice, East and Southern Africa Region, March 2017, World Bank.

<sup>5</sup> Tan, Hong, Sajitha Bashir and Nobuyuki Tanaka (2016), “Skills Use, Skill Deficits, and Firm Performance in Formal Sector Enterprises: Evidence from the Tanzania Enterprise Skills Survey 2015”, Policy Research Working Paper 7672, May, World Bank.

<sup>6</sup> Tan, Hong, Sajitha Bashir and Nobuyuki Tanaka (2016), “Skills Use, Skill Deficits, and Firm Performance in Formal Sector Enterprises: Evidence from the Tanzania Enterprise Skills Survey 2015”, Policy Research Working Paper 7672, May, World Bank. The Common Market for Eastern and Southern Africa (COMESA) is a regional economic community comprised of 19 member states that aim to achieve sustainable economic and social progress through greater cooperation and integration in all areas of development.

<sup>7</sup> GE (2015), “Building strong workforces to power Africa’s growth: The future of work in Africa.”

<sup>8</sup> UNESCO (2015), “UNESCO Science Report: Towards 2030.”

<sup>9</sup> UNESCO (2015), “UNESCO Science Report: Towards 2030.”

<sup>10</sup> UNESCO (2015), “UNESCO Science Report: Towards 2030.”

<sup>11</sup> The World Bank, Position Paper, August 2017. “Strengthening Innovative Entrepreneurial Ecosystems and Financing in Africa.”

education, and an inadequate entrepreneurship ecosystem in the region, as well as a lack of researchers and investment in R&D, innovation ecosystem including R&D facilities, entrepreneurship training, and finance. High growth entrepreneurs are a source of economic growth and job creation. Experience from other countries shows that in order for high growth entrepreneurs to succeed, technology adaptation and diffusion is critical, and this role often has to be played by specialized centers in universities.

**7. A regional approach to build greater scientific and technical capacity that complements country specific initiatives has been accepted as necessary in Africa, given the small base of research capacity and the large number of countries.** While some of the larger and richer countries have established national research funds or councils (such as South Africa, Kenya, Senegal and Ghana), many of the smaller countries do not have the organizational and financial capacity to do so. Even those that have research funds are not fully functional. They lack the budgets and capacity to establish a conducive research environment in their countries, run grant competitions to encourage research in fields crucial for Africa’s development, provide support to improve facilities, and link universities with industry. They are unable to fund applied research on a scale that would transform the research landscape on the continent and advance knowledge creation and innovation to drive economic growth in SSA. In February 2018, Ministers and Heads of delegations from Africa attended the Third Africa Forum on Science, Technology and Innovation (STI) held in Cairo, Egypt convened by African Development Bank (AfDB), and made a Ministerial Declaration committing to enhancing the relevance of national, regional, and continental research and innovation policies. Africa’s Science and Technology Consolidated Plan of Action (CPA, 2005–2014) communicated the continent’s common objectives and actions to improve capacity building, knowledge production and technology innovation for its socio-economic transformation. It also called for greater mobility of scientists across the continent. Its successor, the Science, Technology and Innovation Strategy for Africa (STISA-2024) aims to build on the outcomes of the CPA and accelerate Africa’s STI development. Regional economic communities such as the Economic Community of West African States (ECOWAS) and the Southern African Development Community (SADC) are working towards greater regional scientific integration and have adopted strategies for science, technology and innovation (STI) in the recent past. Similarly, the East African Community (EAC) aims to develop a Common Higher Education Area to establish internationally competitive and harmonized higher education systems in the region. The Bank’s Regional Integration Strategy also recognizes that research and development and scale up of new technology and innovations are better provided at a regional level.<sup>12</sup>

**8. Finally, climate change has been affecting the SSA region especially through an increase in temperature, extreme precipitation, floods, and droughts,** which impact food security, migration, and infectious disease. In order to mitigate this impact, there is a need for developing human capital and knowledge base through research and innovation at the regional level.

## B. Sectoral and Institutional Context

**9. The number of graduates in ASET fields related to transformative technologies and the quality of higher education in these fields is impacted by the shortage of qualified faculty.** African universities have about 50 percent more students per professor than the global average.<sup>13</sup> The serious lack of qualified faculty is driven by three interrelated factors: (i) the absence of a sufficient number of good quality postgraduate programs to

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<sup>12</sup> World Bank (2017). Supporting Africa’s Transformation: Regional Integration Strategy 2017-2023

<sup>13</sup> Africa-America Institute (2015), “State of Education in Africa.”

train faculty locally; (ii) inability to retain highly qualified faculty due to the poor quality of the academic environment including poor facilities and lack of research funding; and (iii) brain drain, with over 10 percent of Africa's highly educated professionals living and working abroad.<sup>14</sup> In recent years, the problem has been further exacerbated by low numbers of new entrants to the academic profession due to lack of scholarships to support their studies and research. There is a need to quickly build postgraduate faculty capacity in SSA countries, particularly in ASET disciplines. A critical element in developing this capacity and improving the quality of post-graduate programs is ensuring the financing of postgraduate programs, including support for students and research, improvement of facilities and faculty pay, and incorporating quality assurance mechanisms of post-graduate programs.

**10. Doctoral training and the development of researchers who can tackle practical research questions are important aspects of developing technical-scientific capability.** Not only are the PhD programs offered in SSA relatively few, but they have low levels of output and little relationship to the needs for highly specialized professionals, especially in those areas related to transformative technologies that could have far reaching impact in society and the productive sector. Further, most SSA universities do not provide post-doctoral opportunities for new PhD graduates through continued support and advice, and ideally working on challenging tasks faced by industry and society. PhD researchers are needed to generate new knowledge, adapt technologies for evolving needs, and innovate to identify solutions to social and industrial challenges. In addition, there is a need for inter-disciplinary research to identify holistic and sustainable solutions to these challenges.

**11. Recognizing these challenges, a few regional initiatives have been launched, including several scholarship programs for graduate studies, to complement country-level initiatives.** While the programs vary in scope and recipients, they can be broadly categorized as supporting degrees in three areas: agriculture, population and public health, and general sciences and engineering. Programs such as Building an Alliance for a Green Revolution (AGRA), African Women in Agricultural Research and Development (AWARD) and Vavilov-Frankel Awards support direct efforts towards agricultural development in Africa. Initiatives like the Consortium for African Research and Innovation (CARI) and Consortium for Advanced Research Training in Africa (CARTA) predominantly focus on the health sector while Africa Development Bank's East Africa Centers of Excellence focus on biomedical sciences. The MasterCard Foundation, the German Academic Exchange Service (DAAD), the Regional Initiative in Science and Education (RISE), and the Carnegie Foundation Africa Diaspora program offer scholarships for general science and engineering degrees. These programs support scholarships for degrees at the Bachelors, Masters and PhD levels. However, most similar initiatives in the SSA region mostly have involved training in foreign institutions and are largely driven by development partners, and therefore have not directly addressed the weak capacity on the continent to train researchers and conduct research as well as the lack of sustainability.

**12. The World Bank financed Africa Centers of Excellence (ACE) projects target the higher education challenge and skills demand on the continent at the sub-regional level.** The Africa Higher Education Centers of Excellence for West and Central Africa (ACE I) and East and Southern Africa (ACE II) are competitively selected centers from African higher education institutions, with a focus on research and training of postgraduates (mostly Masters level students) in sectors such as science, technology, agriculture, health and education. The projects encourage regional student mobility by providing scholarships to Master's students

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<sup>14</sup> OECD (2013), "World Migration in Figures".

to pursue graduate training in the specific sectors within the ACEs in their sub-region, which are identified centers within universities.

**13. The Partnership for skills in Applied Sciences, Engineering and Technology (PASET) was launched in 2013 by African governments with facilitation from the World Bank.** As a unique program led by highly-committed African governments with strong African ownership, and focused on priority sectors for the region, PASET offers a sustainable approach to address the region's needs. It brings together diverse partners including governments, private sector, traditional and new development partners to build competencies from the technician level to the post-graduate level focusing on the skills requirements of priority sectors of SSA countries and the region as a whole. Led by African governments, PASET is governed by a Board of Directors currently comprised of Ministers of Education or Higher Education of five SSA governments – Senegal, Rwanda, Ethiopia, Kenya and Cote d'Ivoire – and representatives of the Korea Development Institute and World Bank<sup>15</sup>. It is expected that governments or partners that contribute to PASET will become formal members and join the PASET Board of Directors, thus growing the partnership. The Board sets the strategic direction of PASET that is executed by the Executive Committee (EC) with advice and expert guidance provided by a Consultative Advisory Group (CAG) comprised of African scientists, academics, and representatives from the private sector and international partner countries. Collectively, the PASET governance bodies shape PASET's initiatives in response to the needs of the SSA countries and region.

**14. The Regional Scholarship and Innovation Fund (RSIF) is the flagship initiative of PASET.** RSIF aims to support doctoral training and post-doctoral research and innovation in about 10 priority economic sectors for growth and development across SSA. These include non-agricultural sectors, which are currently under-developed and have high growth potential, and receive relatively little research funding, such as materials, minerals and mining, electrical power and energy, manufacturing, telecommunication, transportation and financial services.<sup>16</sup> The approach followed by RSIF of supporting three windows, scholarships together with research and innovation grants that improve the quality and relevance of the PhD programs and guarantee continuity and sustainability of research and innovations once the scholars graduate, follows global best practices for such programs. RSIF incorporates "sandwich" training options that include international study at leading partner universities; provides comprehensive support to students at all stages including post-graduate research support; and provides grants to researchers at universities for undertaking work that is relevant to industry or to set up enterprises. The program also aims to build research excellence in ASET fields in about 5-10 SSA universities outside of South Africa by developing the capacity for PhD training and undertaking applied research and innovation in partnership with a network of renowned international partner universities and strengthen research capacity regionwide by prioritizing the scholarships to African faculty that lack PhD training. In the first phase, RSIF universities are competitively selected from among the ACEs, taking advantage of synergies in the two programs.

**15. The most distinguishing features of RSIF are: (i) it goes beyond the center level and supports selected SSA universities to establish a concentration of research excellence within and across inter-related disciplines; (ii) it explicitly links doctoral training, post-doctoral research not only to the application of but also to developing new and optimizing existing transformative technologies; and (iii) it embeds sustainability and ownership by African governments and partners in its design.** RSIF's pan-African, focused

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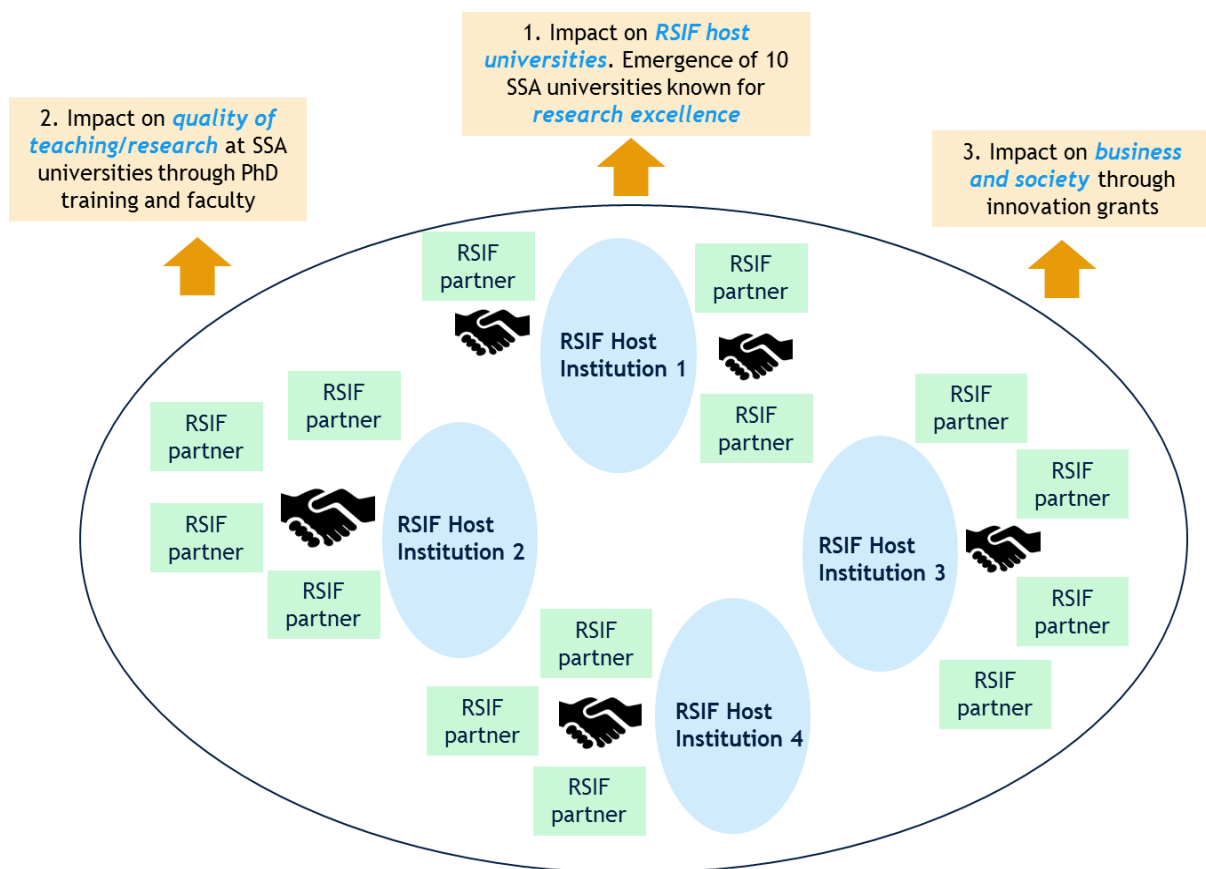
<sup>15</sup> The World Bank will recuse itself from the PASET Board for all discussions on The Regional Scholarship and Innovation Fund (RSIF).

<sup>16</sup> A review of PhD scholarship and research funding in SSA shows that these are heavily tilted towards agriculture and health, given the priorities of donor partners.



and sustainable approach contributes to a solution to the challenge of building, in selected host universities in SSA countries, the high-quality training and research expertise required for transformative technologies, that would benefit the whole region through its graduates and research and innovation results. By focusing its doctoral program on faculty without PhDs, it generates broad spillover and network effects on a larger group of SSA universities beyond the host universities. Furthermore, because of its regional scope, RSIF targets funding from governments, private sector, cooperation agencies and international donors. Currently, five PASET countries have committed to contribute US\$2 million to the RSIF initiative. Kenya and Rwanda have made their contributions, and other countries are making active efforts to follow suit. Five additional SSA countries have expressed interest in joining the initiative. In addition, several private sector organizations have demonstrated interest in supporting RSIF.

**Figure 1: RSIF Network Impacts**



16. Since 2015, several steps have been taken to operationalize the RSIF, particularly its PhD training window. The Institute of International Education (IIE) was recruited as a third-party technical assistance organization to help design and operationalize the scholarship program.<sup>17</sup> In 2016, the PASET Steering Committee (the forerunner of the Board of Directors) appointed the Association of African Universities (AAU), to host the RSIF Implementation Unit in the initial phase. To raise the quality of the PhD programs, in late 2016, PASET signed Memorandums of Understanding (MoUs) with the Korea Institute of Science and

<sup>17</sup> The Institute of International Education currently manages the Fulbright Program in the United States.

Technology (KIST) in Korea, and Maastricht University in Netherlands to collaborate under the RSIF. In early 2017, four Africa Centers of Excellence were formally selected competitively as the RSIF host institutions in three thematic areas of food security, minerals, mining and materials engineering, and information communications and technology (ICT). These four host institutions signed individual agreements with KIST in late 2017. In addition, technical assistance was hired to develop a 5-year financial model for the entire program and a fundraising strategy with an initial target to raise US\$100 million. A preliminary operational manual for the scholarship program was developed detailing the objectives, procedures, guidelines and governing principles for all the stakeholders of the program. Finally, in mid-2017, PASET launched a call for its first cohort of RSIF students. Over 1000 applications from 31 African countries were received indicating a strong demand for scholarships for a regional doctoral training program. Of the 101 students shortlisted and admitted by the host universities, 19 were women and 44 were current faculty members. The first cohort of competitively selected 16 students will enroll in the host universities in May 2018.

**17. In 2017, a preliminary fundraising strategy for RSIF was prepared to guide the expansion of the Fund.** The financial model was developed with a per student cost of US\$97,600/student for a four-year PhD program (or US\$24,400 annually). It aims for implementation of 5 cohorts (from 2017/18 to 2024/25) amounting to 1000 PhDs at a total cost of US\$97.6 million. The strategy estimates that about 70 percent of the funds required would be raised from the private sector and the remaining 30 percent from contributing SSA countries. Private sector donors will be targeted from both the corporate and foundation sectors with support amounts ranging from US\$1 million to US\$10 million. These targets were derived from benchmarking corporate R&D contributions from USA, China and Japan along with other criteria relevant for the African context. The selected corporate sectors targeted are retail, manufacturing and the extractive sectors. An initial listing of target companies has already been developed. Foundation donors will be targeted through open calls for applications and donors known to members of the PASET network or foundation partner, the funding strategy sets the target of US\$2.3 million based on a benchmarking exercise.

**18. Contributions from SSA countries have been set at a minimum of US\$2 million.** This decision was taken by the PASET Board of Directors to encourage African countries to contribute. It was felt that a higher threshold may exclude countries. At the same time, the Board felt that countries needed to make a real contribution if they are to participate in the governance of PASET and benefit from the Fund. In order to assist countries with their contribution, and to grow the fund, countries can use IDA to contribute to the fund. For instance, RSIF is a component of the proposed ACE for Impact project through which countries could make a contribution. Several countries participating in ACE for Impact have shown interest in this option with total contributions estimated at US\$10-12 million.

**19. Implementation of the fundraising strategy will require dedicated staff who have specialized skills and extensive experience in this area.** At the same time, it will be important to build these skills within Africa to continue fundraising to finance enhancement of skills on the continent on a sustainable basis.

**20. The Government of Korea has agreed to contribute US\$10 million<sup>18</sup> to RSIF to support PhD training and research.** About US\$9 million from this contribution, to be administered by the World Bank through a Trust Fund, is expected to be transferred to the RCU and used along with funds from other sources to finance scholarships for doctoral training of African students and research grants to promote research. It will also

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<sup>18</sup> \$1 million from this will be used for Bank executed activities and the standard cost recovery fees for Bank management of the trust fund. The remaining \$9 million will be available for RSIF implementation.

support partnerships with additional Korean universities for “sandwich” programs under the RSIF. The collaboration builds on Korea’s existing partnerships with PASET on RSIF, knowledge sharing and its governance. The agreement has been formalized through a MoU signed on May 23, 2018.

**21. There has also been interest from the private sector and research agencies to provide financial and in-kind support to RSIF.** Philips Research Africa has committed to support scholarships while IBM is keen on hosting RSIF PhD scholars at their research labs in Africa as part of a structured “sandwich” program. DAAD and German Research Foundation (DFG) expressed interest in issuing joint Calls for Scholarships with PASET while the French Research Institute for Development (IRD) proposed hosting RSIF scholars at their centers and labs in addition to having joint applications for research funding by IRD and RSIF researchers. MoUs have been prepared and discussions are on-going between PASET and these organizations. Active outreach efforts continue with other private sector companies and organizations.

**22. The experience of designing and operationalizing the RSIF over the last two years shows that there is strong commitment and ownership by African governments to establish a sustainable pan-African science fund that will raise the quality of doctoral training and research in African universities and institutions.** However, difficulties of coordination across countries, lack of technical expertise and lack of dedicated efforts to mobilize funds have hampered efforts to take it to scale. The World Bank has been providing support through small trust funds to provide technical assistance to establish the design and necessary processes for the RSIF doctoral training window, coordinate governance, convene governments and partners, and support fundraising efforts for the initiative thus far. With the basic platform, operational design, and governance structure now in place for RSIF, it is an appropriate time to take the initiative to scale. To do so, dedicated support is required to raise the quality of the programs, select RSIF host universities, improve the student selection process, identify partner universities, establish international review panels, and use data to benchmark and improve quality of universities. The research and innovation windows also require detailed technical design and definition of operational procedures. In addition, committed efforts in terms of outreach and communication are needed to fundraise from governments, donors and other organizations.

**23. A sustainable pan-African fund is required given that building technical-scientific capacity, especially in the new emerging transformative technologies, demands sustained investment and a regional approach.** To increase sustainability and leverage funds from governments and donors, it is proposed that the RSIF will be composed of two funds, (i) a General Fund which will be used to finance the grants for PhDs, research and innovation grants on an-ongoing basis; and (ii) a Permanent Fund whose returns will be used to finance these grants in the long run. Contributors to the RSIF may contribute to either the General Fund or the Permanent Fund, or both; they may also contribute to one or more of the grant windows and/or specify which disciplinary areas they wish to sponsor. A regional approach addresses fundamental diseconomies of scale, as a critical minimum size is required for creating impact and to improve efficiency through lower administration costs. Furthermore, a regional platform brings together scarce organizational capital to attract and manage funding in an efficient manner from diverse partners who may wish to contribute to different windows or areas. In addition, a pan-African fund would complement the efforts of national research funds to build research and innovation capacity, creating a fertile environment for innovations and transformative technologies, and facilitate partnerships with industry and international partner universities.

**24. The World Bank proposes to support RSIF through** (a) a regional grant for capacity building of a regional organization to administer and grow the RSIF; (b) country contributions using national and regional IDA credit

(in addition to their own resources); and (c) contributions from other donors, including governments and foundations, that prefer to channel their contributions to the fund through the World Bank. In addition, other donors, including the private sector, could also transfer funds directly to the RSIF, as it will comply with international standards for governance and fiduciary oversight, as well as efficiency of implementation.

**25. There is a need of a technically strong and capable regional organization to manage, implement and grow the RSIF to scale.** Given the efforts and expertise required to scale up the RSIF and coordinate across multiple stakeholders, a forward-thinking organization with efficient financial systems, ability to manage large grants, experience implementing programs in Africa from concept to the operational stage especially in higher education, science, technology and innovation, and experience working with governments, donor organizations and private sector is critical to serve as the Regional Coordination Unit (RCU). The PASET EC welcomed Bank support for RSIF and agreed that a call for proposals for the RCU, which would fulfil the mandate of the RSIF, should be issued. Accordingly, the Bank project team issued a call for proposals to ensure a fair, transparent and rigorous selection process for the RCU in 2017. The issue was further discussed at the PASET Board of Directors meeting in January 2018, which endorsed the call for proposals and further advised that members of the PASET EC and CAG should be involved in the selection.<sup>19</sup> The Board stressed that the selected organization should be an African organization with a regional mandate.

**26. Following a competitive selection, the International Centre of Insect Physiology and Ecology (*icipe*) based in Nairobi, Kenya, was selected as the organization best placed to serve as the RCU for its strong processes and systems, governance and demonstrated experience in PhD capacity building and research commercialization.** *icipe* is a leading scientific organization with a nearly 50-year history that has contributed to science and innovation in sub-Saharan Africa. It has an extensive network of partners in Africa and across the world including 43 partner universities and 300 other partners including governments, donors (like United Kingdom Aid, Swedish International Development Cooperation Agency (Sida), Swiss Agency for Development and Cooperation (SDC), Federal Ministry of Economic Cooperation and Development of Germany (BMZ)) and organizations in the areas of research, capacity building and translating research into societal impacts. It has followed a unique inter-disciplinary approach in relation to research on insects, focusing on crop, animal and human health as well as environmental sciences and biotechnology. This has allowed *icipe* to develop a strong cross-disciplinary network of scientists. The organization has existing capacity to facilitate strong partnerships for RSIF to raise its quality further and attract greater financing. Furthermore, *icipe* has strong private sector collaboration experience including expertise in the commercialization of research. These areas all align perfectly with the focus of the RSIF on PhD training, research and innovation. *icipe* currently manages several similar initiatives in Africa. Under the BioInnovate Africa project funded by the Swedish International Development Cooperation Agency (Sida), it supports research and innovation for multidisciplinary teams of scientists and innovators and supports PhD training. It also supports PhD training with funding from the German Academic Exchange Service (DAAD) and various other donors.

**27. However, given the scale of the RSIF and the fact that this is a new initiative, there is need to build the capacity of *icipe* further to implement the initiative successfully and sustainably** and serve as a scientific, technological and innovation capacity builder for PhD programs and universities in the SSA region, especially regarding transformative technologies. Specifically, *icipe*'s technical and financial capacity and systems need to be strengthened to build and manage PhD training, research and innovation programs from inception, including the definition of detailed processes, to coordinate across diverse actors like governments, donors,

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<sup>19</sup> PASET Board of Directors Meeting Minutes, January 2018, PASET.

universities and private sector, over a variety of sectors, and to set up and grow a sustainable fund that can support the initiative over the long-term. The capacity of *icipe* as the RCU will be critical for realizing the vision for RSIF.

### C. Higher Level Objectives to which the Project Contributes

**28. The project contributes directly to the third strategic priority for the Africa Region – improve human capital and access to basic services – and the third priority for the Strategic Priorities for WBG’s Support for Regional Integration – scale-up access to quality public services and entrepreneurship through complementary regional solutions,**<sup>20</sup> by contributing towards building capacity to enhance the scientific and technologically skilled workforce in ASET fields that can catalyze the generation and application of transformative technologies for economic growth in SSA. By adopting a regional approach, the project aims to strengthen a regional organization to become a capacity builder that offers technical support for the required specialization and excellence in selected SSA universities, so that students from all SSA countries benefit from training in high quality PhD education across disciplines and contribute to the development and application of transformative technologies. With this investment, the project will create the technical capacity required for the region to produce a pool of talented human capital in fields related to these technologies who will contribute to bringing more investment and to creating jobs in the region to achieve economic growth. The project will also develop strategies to attract more women to these fields and monitor their contribution. Furthermore, it will develop a sustainable education, research, and innovation eco-system to train students to be problem solvers for their own countries using their scientific and technical skills.

## II. PROJECT DEVELOPMENT OBJECTIVES

### A. PDO

**29. The objective of the project is to strengthen the institutional capacity for quality and sustainable doctoral training, research and innovation in transformative technologies in Sub-Saharan Africa.**

30. Institutional capacity relates to the capacity of the RCU (*icipe*) and the selected SSA host universities that will benefit from capacity building from the RCU.

31. While the broad list of transformative technologies is provided in paragraph 2, each round of university selection will list the precise disciplinary areas, based on advice from the PASET governance bodies and the CAG.

### B. Project Beneficiaries

32. The beneficiaries for this project include:

- (a) Existing young academic faculty of African universities and other young Africans who will receive PhD scholarships;
- (b) Young African scientists and engineers entering academia, industry or business;

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<sup>20</sup> World Bank Report No. 121912-AFR: Supporting Africa’s Transformation: Regional Integration and Cooperation Assistance Strategy for the period FY18-FY23, December 2017.

- (c) *icipe* that becomes a science, technology and innovation capacity building hub for SSA;
- (d) African institutions that train PhD students and become internationally recognized in ASET fields;
- (e) Faculty and students of the African institutions hosting or hiring RSIF scholars who benefit from the improved quality and capacity of the institutions;
- (f) Industry that can hire better graduates, increase innovation capacity and use transformative technologies; and
- (g) Society that will benefit from the use of transformative technologies.

### C. PDO-Level Results Indicators

33. The following indicators will measure progress toward achieving the PDO:
- (a) Growth of the Regional Scholarship and Innovation Fund.
  - (b) Number of PhD scholars that have enrolled in RSIF programs (%female).
  - (c) Number of implemented networks<sup>21</sup> between SSA host universities and international partners for PhD training and research collaboration.
  - (d) Number of students/staff that take cross-cutting courses, entrepreneurship and/or research commercialization courses supported by the project.
  - (e) Number of research papers submitted by staff members or scholars supported by the project for publication to internationally indexed journals (% female).

## III. PROJECT DESCRIPTION

### A. Project Components

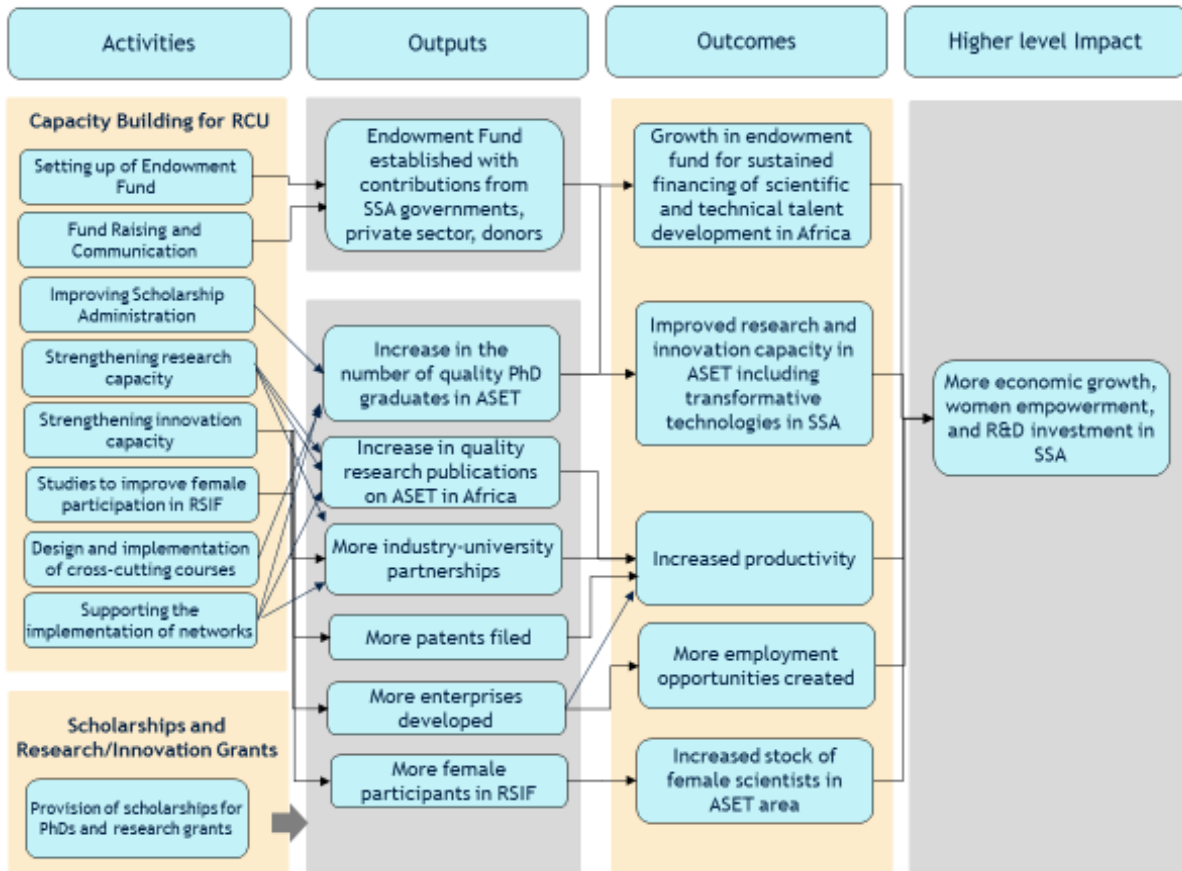
34. **The Project will build on the established framework of the PASET Regional Scholarship and Innovation Fund (RSIF)** to strengthen the institutional capacity for quality and sustainable doctoral training, research and innovation in the applied sciences and engineering fields that support transformative technologies. To this purpose, the Project will have two main components: a first component financed by an IDA Regional Grant with the objective of strengthening the RCU to become a scientific, technological and innovation capacity builder for SSA; and a second component financed by a grant from the Government of Korea that will finance the scholarships and research grants in selected ASET fields in order to improve the quality of doctoral training and research in selected African universities, in collaboration with international universities. As described earlier, additional funds for the scholarship, research and innovation grants will be leveraged through national/regional IDA for country contributions and contributions from other partners.

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<sup>21</sup> Implemented networks mean that there are signed network agreements between SSA host universities and international partners describing the activities to be conducted as a network under the theme where synergies exist. Networks must be made up of at least 4 institutions comprised of a RSIF host institution, one African institution (could be another RSIF host institution) and two international partners, at least one from outside of Africa.



**Figure 2: Results Chain**



**35. Component 1: Capacity development for the operation and management of the Scholarship, Research and Innovation Fund (IDA Regional Grant US\$ 15 million).** This component will support strengthening of the RCU to become a scientific, technological and innovation capacity builder for PhD programs and universities in SSA in the fields of applied sciences and engineering that support transformative technologies, to make it capable of operating and growing RSIF efficiently and sustainably.

- a. **Subcomponent 1.1: Capacity building for managing and growing the RSIF General Fund and setting up a RSIF Permanent Fund (US\$2.8 million):** This sub-component will build the capacity of the RCU to engage in innovative fund-raising strategies to reach diverse donors with different interests as well as the design, operationalization and enhancement of a permanent endowment fund to finance scholarships, research and innovation grants in Africa on a sustainable basis. This subcomponent will finance: (i) regular and efficient fund-raising from African governments, partner governments, individual and institutional donors, private sector, for both the General and the Permanent Fund and the different windows of RSIF, which allows for visibility for contributors; (ii) the design of a Permanent Fund including its statutes, governance, structure and funding strategies as well as identification and selection of a Fund Manager; (iii) design and implementation of robust systems for funds management, including endowments; (iv) studies necessary for successful implementation and guaranteeing the sustainability of the Permanent Fund, including studies related to mechanisms

based on solidarity for the beneficiaries to return to the Permanent Fund part of the benefits received by: scholars once they graduate and find a job; and/or universities and industry once they have benefited from results from research and innovation projects financed by RSIF; and (v) activities to improve financial management of the RCU. The target for additions to the RSIF General Fund during the project period is US\$50 million. For the Permanent Fund, the target is to obtain seed funding of US\$15 million.

- b. Subcomponent 1.2: Capacity development for the operation and management of doctoral training scholarships in selected African universities and research grants in ASET fields (US\$3.7 million).** This subcomponent will support setting up of a PhD scholarship and research grants administration unit at the RCU, to design and implement strategies to contribute to the improvement of RSIF PhD programs and to operate and manage the training of doctoral students, and manage research grants, in ASET fields that support transformative technologies in priority sectors of the region. Specifically, this subcomponent will finance the following activities: (i) development and implementation of all the managerial and ICT processes and systems required by the RCU for the scholarships and research grants and their interfaces in host universities. This includes defining a methodology for data collection and analysis, which enables the RCU to assess the impact of the scholarship in comparison with other universities in the region leveraging the ongoing regional benchmarking initiative under the PASET; (ii) improve the design of and manage, under the guidance of the PASET EC, the selection processes for scholars, host universities and international partners; (iii) improve mechanisms and design strategies for increasing participation of women in PhD programs and undertake research; (iv) design and implementation of monitoring and evaluation strategies; and (v) pilot implementation of five research grants for faculty of host institutions to support research projects in ASET fields related to transformative technologies aligned with the needs of the priority sectors.
- c. Subcomponent 1.3: Capacity development for improving quality of PhD programs and research in ASET fields (US\$6.1 million).** This subcomponent will aim to build the capacity of host universities and the RCU to improve the quality of PhD programs and of research conducted in RSIF universities through several capacity building activities including: (i) support RCU in the design and implementation of cross-cutting PhD courses, training courses and mentoring programs, including climate change and transformative technologies; (ii) support the creation and implementation of academic networks among host institutions and international partners participating in RSIF to promote the capacity of universities to plan and implement academic activities to improve PhD programs (such as curricular reform, sharing of infrastructure, research, link to industry and development of soft skills, among others) as well as among RSIF scholars and researchers; (iii) development of standardized MoUs and agreements between SSA host universities and international partner institutions to reduce costs of collaboration and development of frameworks for intellectual property; (iv) support SSA host universities to seek international accreditation of PhD programs and institutional accreditation; (v) document, disseminate and promote the implementation among host institutions of good international practices in PhD training, including responsible conduct of research (ethics) and compliance; and (vi) increase the access to scientific, technological and innovation journals and other published material to the RCU and RSIF researchers and PhD students.
- d. Subcomponent 1.4: Capacity development for the operation and management of innovation grants (US\$2.4 million).** The RCU will set up an innovation grants administration unit to manage



innovation grants. This subcomponent will strengthen the unit by supporting: (i) development and implementation of all the managerial and ICT processes and systems required by the RCU for the innovation grants; (ii) improve the innovation and entrepreneurship capacity within the RCU, so that it is able to transfer best practices in this area to other participating RSIF organizations through, for example, developing tailor made courses on entrepreneurship and business model development and developing professional business incubation capability, new forms of networking and partnerships, e.g. with private sector and social investors, innovation ecosystem strengthening and sound management of intellectual assets and intellectual property; (iii) scoping exercises to identify existing incubators, accelerators and tech hubs for potential partnership on capacity development and innovation, and professional networks, conferences, and competitions on innovation and entrepreneurship as well as venture capital and investors for Africa; (iv) a background study on best practices for IP office establishment and IP policy of host university countries; (v) design and implementation of monitoring and evaluation strategies of the innovation grants; and (vi) pilot implementation of six innovation grants to support innovation-enabling environments in host institutions and five innovation grants to support innovation projects and commercialization of research in ASET related areas aligned with the needs of the priority sectors, presented jointly by faculty of host institutions involved in a PhD program with RSIF scholars and private productive sector.

**36. Component 2: Scholarships and Research Grants for ASET (US\$9 million from Government of Korea).**

This component, financed by a US\$9 million<sup>22</sup> contribution from the Government of Korea administered by the Bank, will provide financing for scholarships and research grants in ASET fields in Sub-Saharan Africa. SSA countries have shown interest in contributing funds to RSIF either through their own resources or through national/regional IDA credit. Some of these contributions may also be channeled through regional IDA projects, for instance the proposed ACE III, which is currently under preparation.

- a. Subcomponent 2.1: Doctoral training in ASET fields in selected SSA host Universities and international partner universities (US\$7.25 million from Government of Korea):** This subcomponent will provide scholarships to finance 3- 4-year PhD training programs in priority areas for citizens of SSA countries at African host universities competitively selected by an independent evaluation committee through a rigorous two-stage process (details in Annex 1). Scholars will be selected by the host universities and undergo a further stringent competitive selection process conducted by an independent international committee that will ensure that the best students with the strongest research potential and leadership capabilities are admitted into the RSIF program. Priority will be given to meritorious and promising young African faculty without PhDs and females. International partner universities will be selected from proposals from host universities and the RCU based on proven strength in PhD training, research, innovation in the corresponding area, experience and willingness to work with RSIF host universities and ASET fields relevant to SSA. Scholarships will include “sandwich” training that will allow students to complete part of their doctoral program at international partner institutions or companies. During the program, scholars will have a chance to be exposed to leading thinkers and practitioners to combine their research topics with transformative technologies to have a greater impact on society.

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<sup>22</sup> After accounting for cost recovery fees and Bank executed activities

- b. Subcomponent 2.2: Research grants (US\$1.75 million from Government of Korea):** This subcomponent will finance grants to support research projects in ASET fields related to transformative technologies aligned with the needs of the priority sectors. There will be two types of grants: (i) grants to faculty of RSIF host institutions involved in a PhD program with RSIF scholars; and (ii) grants to RSIF graduates who obtain a post-doctoral or permanent position in an academic institution or research center in SSA. In both cases the proposals will require endorsement and co-financing by the institution. Grants will be assigned through open competitive calls and will be selected by international selection committees to ensure independence and high quality and relevance of projects. Selection criteria of the grants include application to transformative technologies and a workshop will be held for the applicants to learn about these technologies and potential applications.

#### B. Project Cost and Financing

37. The proposed project is financed by a US\$15 million IDA grant which will strengthen capacity of the RCU, *icipe*, and a US\$9 million grant from the Government of Korea to finance scholarships and research grants.

**Table 1: Project Cost**

Project Components	Project cost	IBRD or IDA Financing	Trust Funds
<b>Component 1: Capacity Development for the operation and management of the Scholarship, Research and Innovation Fund</b>	<b>\$15.00 million</b>	<b>\$15.00 million</b>	
Subcomponent 1.1: Capacity building for managing and growing the RSIF General Fund and setting up a RSIF Permanent Fund	\$2.80 million	\$2.80 million	
Subcomponent 1.2 Capacity development for the operation and management of doctoral training scholarships in selected African universities and research grants in ASET fields	\$3.70 million	\$3.70 million	

Subcomponent 1.3: Capacity development for improving quality of PhD programs and research in ASET fields	\$6.10 million	\$6.10 million	
Subcomponent 1.4: Capacity development for the operation and management of innovation grants	\$2.40 million	\$2.40 million	
<b>Component 2: Scholarships and research grants for ASET</b>	<b>\$9.00 million</b>	-	<b>\$9.00 million</b>
Subcomponent 2.1: Doctoral training in ASET fields	\$7.25 million	-	\$7.25 million
Subcomponent 2.2: Research grants	\$1.75 million	-	\$1.75 million
<b>Total Costs</b>	<b>\$24.00 million</b>	<b>\$15 million</b>	<b>\$9.00 million</b>

### C. Lessons Learned and Reflected in the Project Design

38. The RSIF project incorporates important lessons from the World Bank-funded ACE I and II projects (P123974 and P151847) as well as other global and regional scholarship and research and innovation grants programs.

39. **African ownership:** As demonstrated by the ACE I and ACE II projects as well as other regional projects, strong regional ownership is required for successful outcomes. The RSIF was conceptualized by African higher education experts and academics with facilitation by the World Bank and is governed by a Board of Directors comprised of Ministers of Education or Higher Education of five countries that have each made financial commitments to the RSIF. The RSIF project will foster this ownership by continuing to use the PASET governance structures to provide direction to RSIF activities. Further, the project will be aligned to priority sectors for Africa's growth as identified by the PASET Board and through regional consultations. In addition, the RSIF African host universities, key stakeholders in the project, will remain important partners in the selection process for RSIF scholars. Students must be accepted by host institutions first before undergoing a second round of selection by the RSIF independent committee.

40. **Sustainability:** Several higher education scholarship and research and innovation programs often depend on external grants and funding to finance their activities. While these programs can achieve effective results, and support numerous beneficiaries, they are not always sustainable in the long-run. In order to ensure the sustainability and leverage government and partner contributions, the RSIF will support design of a permanent fund whose revenues will be used to finance PhD scholarships, research grants and innovation grants for young Africans, while maintaining the capital of the fund, even after the completion of the 5-year project. A

similar model has been implemented by the Indo-US Science and Technology Forum, which uses annual interest from its endowment fund to sustainably support US-India collaborations in innovation and entrepreneurship in science and technology.<sup>23</sup> The Cambridge-Africa ALBORADA Research Fund is another example of a permanent fund that finances research collaborations between researchers at the University of Cambridge and in SSA.

**41. Effective fundraising:** An endowment fund will support the sustainability of the project. Therefore, it is important to ensure that there is efficient fundraising to seed the fund and grow the capital to support higher returns in the long-term to finance the scholarships, research and innovation grants as well as to grow the General Fund. Fundraising is a specialized activity requiring specific professional skills including marketing, networking and communications skills. The project will support the RCU with strengthening the existing RSIF fundraising strategy. It will also build its capacity to raise funds on a sustained basis through recruiting experienced fundraising experts to mobilize funds from diverse sources such as governments, private sector, donors and others, as well as training members of the RCU team to demonstrate and communicate the success of the RSIF to attract further funds.

**42. Focus on capacity building and quality:** While creating a critical mass of graduates in ASET areas that support transformative technologies is crucial to building a skilled workforce that can catalyze the socio-economic transformation of Africa, the quality of the programs is just as important for a lasting impact. RSIF will support capacity building for the RCU to become a science, technology and innovation capacity building hub for SSA that will support the host universities to enhance the quality of the PhD training programs through curriculum development and support to faculty by international partner institutions. The RSIF project will also help universities develop a more facilitative and nurturing research and innovation environment. Experience from capacity building of the public sector in Africa suggests that capacity building must be treated as a core objective and be tracked diligently to facilitate better results.<sup>24</sup> Furthermore, there should be strong ownership of the capacity building undertaken. While these lessons are derived primarily from experience with the public sector, this project takes them into account in the design of capacity building for a regional organization. Capacity building is the primary objective of the project and the activities will be monitored regularly through five PDO indicators, three of which are explicitly on capacity building, to ensure high quality results. In fact, the project design, which strengthens the capacity of the RCU to manage scholarships, and research and innovation grants while also providing it an opportunity to implement the activities, allows for a “learning-by-doing” approach and a chance to have more on-going capacity building based on gaps identified. In addition, there is strong ownership of the project by the RCU.

**43. Support for scholars at all stages:** A report commissioned by PASET during the inception stage of the RSIF notes the importance of incorporating student support at all stages of their training, right from their recruitment into a doctoral program to their reintegration to ensure they are able to successfully complete their programs and have an impact. For example, the AWARD program includes mentoring of fellows by senior professionals to help them strengthen their research and leadership skills. The RSIF will not only ensure that host universities have adequate support systems in place, including for regional students, to help students succeed but will also support RSIF PhD graduates following the completion of their training by providing them research grants or innovation grants to continue their research or to undertake entrepreneurial pursuits.

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<sup>23</sup> Indo-US Science and Technology Forum. *Annual Report 2016-17*.

<sup>24</sup> World Bank (2005). “Capacity Building in Africa: An OED Evaluation of World Bank Support.”

44. **Partnerships:** Partnerships are an important element for creating high quality, market demand driven programs. A review of scholarships programs for Africans for a report commissioned by PASET revealed that sandwich programs which incorporate international and home country training in fields where Africa's capacity or quality of programs is limited, greatly benefited students. Students that graduated from such programs reported that they gained greater disciplinary knowledge as well as soft skills. RSIF incorporates sandwich programs into its doctoral training and aims to have 15-20 leading international partner institutions for students to choose from. RSIF will also forge partnerships with industry to promote more market-relevant training, research and innovation.

## IV. IMPLEMENTATION

### A. Institutional and Implementation Arrangements

45. **The core implementing unit is *icipe* which will play the role of the RCU** that will receive and administer the grant funds under the supervision of the World Bank and with strategic direction of the PASET governance bodies. A transparent and rigorous competitive process was carried out to select the RCU to ensure fair selection of the most appropriate regional organization to host the RCU. *icipe* was selected as the organization with the people, processes and systems, and governance and stability to host RSIF. *icipe* is based in Nairobi, Kenya.

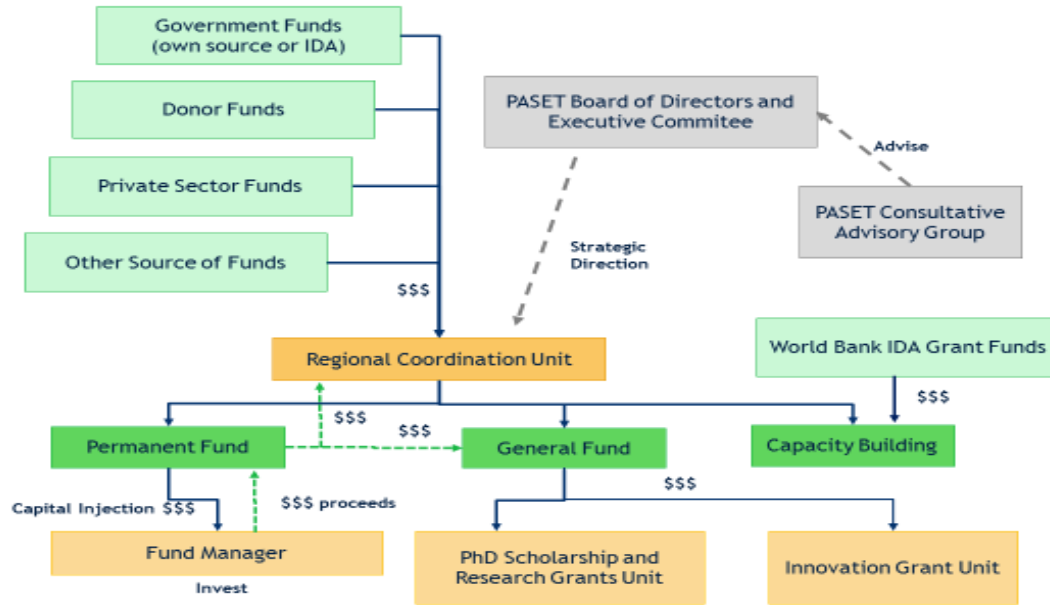
46. **The RCU will be in charge of the overall coordination, planning, monitoring and evaluation of project activities.** It will also take care of any financial management and procurement necessary to carry out project activities. It will be responsible for managing and growing the General and Permanent Fund by fundraising and making profitable and smart investments. Profits from the investments under the Permanent Fund will finance the RSIF General Fund which will be used to implement the three RSIF windows and their administrative costs as well as other capacity building activities at host universities as needed.

47. **RSIF administration units will manage the activities of each of the RSIF windows for PhD training, research and innovation.** Under the RCU's supervision and coordination, the administration units will manage the key activities as well as day-to-day administration for the PhD scholarship program, the research grants and innovation grants including selection of RSIF PhD scholars, evaluation of proposals for research and innovation grants, coordinating with host universities and RSIF scholars and grant recipients to respond to their queries among other activities.

48. **PASET's Board of Directors will set the strategic direction for RSIF and monitor activities.** The Board of Directors is currently comprised of the Ministers of Education or Higher Education of the African countries that are PASET members, a representative of Korea and a representative of the World Bank. Going forward, for all RSIF related discussions, the World Bank member will be recused from the PASET Board. Other countries or partners that contribute to the RSIF can become members of the Board. The Board of Directors will be responsible for the overall strategic direction and vision of the RSIF. The EC, currently comprised of senior technical advisors to the Ministers of the five PASET member countries, will monitor implementation of activities and provide overall guidance for effective project implementation. The PASET CAG, an advisory body composed of predominantly African scientists, academics and experts as well as representatives of private sector and international partners will provide guidance to the Board on regional priorities, goals and any technical aspects of the RSIF. The current governance structure is laid out in the PASET Charter and

Governance Manual, which may be revised periodically as the partnership grows.

**Figure 3: Organizational Chart**



### B. Results Monitoring and Evaluation

49. **PDO and intermediate indicators will be reported by the RCU.** The RCU will be responsible for collecting project implementation data from sub-units or their own staff managing the scholarship, research and innovation grant administration. RSIF host universities will use the existing reporting system for the RSIF PhD scholars' progress. The RCU will conduct a student satisfaction survey to ensure that the scholars are on track and necessary support is being provided. For the permanent fund, the fund manager will be required to report to the RCU and an accountant will conduct the audit of the fund account periodically. The impact of capacity development on RSIF host institutions will be evaluated at mid-term and at the end of the project.

### C. Sustainability

50. **The RSIF is likely to be sustained after grant financing is over.** First, the project will set up the permanent fund to generate revenue on its own. Thus, financial sustainability is secured through this scheme. Second, PASET is supported by strong government commitments, thus, political risk of losing the fund is low and the ownership of the fund is high. Third, alumni from the RSIF scholarship and recipients of research and innovation grant will serve as a strong community to maintain the brand and operation of the RSIF. They will become a core engine of the long-term sustainability of the fund. They are also expected to contribute back to RSIF and promote RSIF within their community. Fourth, RSIF host universities are expected to become prestigious universities with high quality research and innovation capacity. They will develop a sense of strong ownership of the RSIF and contribute to its sustainable operation. Fifth, government, country, private sector and civil society partners to be developed throughout the life of the fund will serve as a supporter and collaborator for the sustainability of the fund.

#### D. Role of Partners

51. Financial and in-kind contributions from governments, international cooperation organizations and foundations, private sector and university partners will further enhance the sustainability of the PhD scholarship, research and innovation programs. The RCU will work with the following types of partners:

- (a) Government partnerships:** Governments are key partners on the RSIF initiative as they represent national and regional ownership of the RSIF. Apart from the five SSA governments that have made financial commitments to the RSIF, several other SSA countries have expressed strong interest in the RSIF including Tanzania, Nigeria, Guinea, Mauritania and Mozambique who have sent letters to PASET and/or World Bank indicating their interest. In addition, Ghana, Burkina Faso, Cameroon, Benin, Togo, The Gambia, Mali, Democratic Republic of Congo, and Zambia have participated in high-level discussions on RSIF and received the initiative positively. The initial interest of governments has been for the PhD grants, as this has reached an advanced stage of design. Further outreach will be done as the different RSIF windows are developed and the Permanent Fund is designed, in order to further incentivize governments and clarify the benefits they would obtain from their contributions.
- (b) International cooperation organizations and foundations:** The Project's objectives align with the stated goals of several international cooperation organizations, foundations and other donors and non-governmental organizations that work in the SSA region or wish to do so. A special feature of the RSIF is the involvement of African governments as well as the World Bank, which is attractive to international cooperation organizations and foundations that are interested in sustainability. A fundraising strategy will be supported by Subcomponent 1.1 and implemented by the RCU under the guidance and supervision of the Bank's team and the PASET Board and EC. It will seek innovative ways of enabling financial contributions that are linked to potential donor priorities, while being aligned with the RSIF priorities.
- (c) Private sector:** Private sector partners can strengthen the industry linkages and promote more demand-driven training, research and innovation for the RSIF. Private sector corporations can provide matching or non-matching contributions to the RSIF General or Permanent Fund for doctoral training scholarships, research funding or innovation grants. Contributions can also be in the form of internships or apprenticeships for RSIF scholars, co-supervision of RSIF scholars by industry experts, designing and teaching of short courses by industry experts, capacity building, hosting of RSIF researchers at industry labs and provision of entrepreneurship training. Several private sector organizations have demonstrated interest in RSIF. For example, Philips has pledged support for a scholarship for PhD training, IBM Africa can host RSIF PhD students in IBM Research labs in a structured program, and Samsung can potentially sponsor costs for RSIF scholars participating in the sandwich program in Korea and discussions are on-going with organizations like Intel and National Instruments. In addition to corporations, the RSIF fundraising strategy also envisages contributions from individuals.
- (d) Research Organizations:** Research organizations provide an excellent partnership opportunity for RSIF scholars. The organizations can provide grants for research or apply for joint calls for grant proposals with RSIF scholars. Similar to the private sector, they can also support RSIF through in-kind



contributions by hosting RSIF scholars at their labs as well as providing technical assistance to the individual administration units for the project. DAAD has indicated the possibility of launching a Call of Scholarships that RSIF could apply to and offered technical assistance for the scholarship administration unit, DFG and IRD have demonstrated interest in jointly applying for grant funding with RSIF scholars, and IRD can also facilitate hosting RSIF scholars at their labs in Africa and France.

- (e) **University partners:** Leading international universities with top-level programs in ASET areas are important partners for RSIF’s sandwich program that allows scholars to complete a part of their PhD training at eminent institutions abroad. These partner institutions will also support capacity building of RSIF host universities through curriculum development support and faculty exchanges. RSIF currently has MoUs with the KIST, Korea and Maastricht University, Netherlands to host students for sandwich programs and provide curriculum development support to universities. Partnership talks are also ongoing with the Royal Veterinary College, UK and Seoul National University, Korea.

## V. KEY RISKS

### A. Overall Risk Rating and Explanation of Key Risks

52. **The project has a substantial risk due to its innovative design and regional nature.** The project is pan-African, will need to consolidate the sub-regional interests and needs within the SSA region and is built on the premise that African governments and private sector will be committed to making priority investments in PhD training and research and development. Furthermore, the variety of stakeholders to be engaged in the project, including governments, private sector, donor agencies and international organizations, each one with different interests, impose challenges and add to the risks of the project if not properly considered. Additional risks are related to the capacity of the RCU, which will be mitigated by the strengthening activities supported by Component 1.

**Table 2: Systematic Operations Risk-Rating Tool (SORT)**

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Low
8. Stakeholders	Moderate
<b>OVERALL</b>	<b>Substantial</b>

53. **Macroeconomic – Substantial.** Economic growth in Sub-Saharan Africa continues to recover steadily and is forecasted to pick up to 3.1% in 2018. This moderate growth upswing remains uneven, with considerable variation across countries. Among Sub-Saharan Africa’s largest economies, there continues to be a slower than previously anticipated recovery in the oil sector and continued challenges in the non-oil industrial sectors.



54. **Technical design of the Project – Substantial.** A key part of Project design is the establishment of a Permanent Fund which will require careful consideration of legal and financial complexities and includes risks in the technical design such as lack of additional donor support to co-invest in the Fund to ensure sufficient payout to serve the stated objectives of the Project; and risk of poor investment performance that will result in insufficient payout to serve the stated objectives of the Project or capital loss. The Project focuses on building the capacity of the RCU, specifically through hiring of an experienced Permanent Fund Manager to mitigate these risks.

55. **Institutional capacity for implementation and sustainability – Substantial.** *icipe* was selected as the RCU for the RSIF through a competitive process upon demonstrating the ability to manage a Fund of this nature. It has successfully managed donor financing in the past and has a track record of effective collaboration with a number of stakeholders including African government, private sector and international partners. However, it has limited experience with establishing and growing an endowment fund and intensive investments in its capacity are required to raise funds at the scale envisaged under the Project. This is being mitigated through the capacity building efforts under component 1 of the Project. At the same time, Project design includes piloting of research and innovation grants to demonstrate *icipe's* capacity to effectively and efficiently manage RSIF and include an element of learning by doing.

56. **Fiduciary – Substantial.** The main fiduciary risks emanate from *icipe's* inexperience with World Bank policies and procedures. To mitigate this risk, training of relevant *icipe* staff is planned in the early stages of implementation of World Bank procedures.

## VI. APPRAISAL SUMMARY

### A. Economic and Financial (if applicable) Analysis

57. **This project is structured in two main components: (1) developing the capacity for the operation and management of the Scholarship, Research and Innovation Fund, and (2) providing scholarships for PhD training and research grants in ASET fields.** The first component aims to strengthen the institutional capacity of a Regional Coordination Unit, selected to become a science, technology and innovation capacity building hub for Sub-Saharan Africa. Because it consists of technical assistance to build the capacity for enhancing the research and innovation environment in several SSA countries, the direct benefits of this component cannot be completely captured by a cost benefit analysis. Therefore, its significance is justified by assessing the benefits of investing in the capacity building of a regional coordination unit, building on the evidence available related to the impact of developing cluster initiatives. Furthermore, the benefits from the capacity building component are also associated with the positive impacts generated by the development of the activities linked to the RCU strengthening: the PhD scholarships, research and innovation grants.

58. **Component 2 has two subcomponents: (1) the provision of scholarships for doctoral training in ASET fields, and (2) the financing of research grants for projects in ASET fields related to transformative technologies aligned with the needs of the priority sectors.** As the direct benefits of subcomponent 2.2 cannot be completely measured, the economic and financial analysis has focused on subcomponent 2.1, related to the scholarships. Furthermore, under this component, the scholarship window is the major investment allocation, representing 80 percent of the total financing.

**59. The proposed project is best undertaken through public financing.** First, investments in higher education can increase productivity and lead to greater economic growth. However, due to market failures brought about by information asymmetries, there can be underinvestment in higher education as individuals do not recognize the actual returns to be gained from such investments. Employment probability and wages might not reflect the actual productivity and skills level of employees leading to underinvestment. In addition, firms also have lower incentives to provide training due to the potential loss of talented workers. Second, investments in R&D involve risks as the knowledge generated is often a public good. However, the scientific and research knowledge born out of these investments form the foundation of important innovations that drive economic growth in region and propel the region's development. The proposed project is important as it will directly support investments in doctoral training of African scholars who will contribute to a highly skilled labor market in science and technology fields needed for Africa's development and will support the development of R&D capacity in the SSA region.

**60. The World Bank as a convening power can facilitate engagement from a wide variety of partners** including private sector, donors, and governments (African and non-African) to invest in the pan-African science fund as well as provide technical assistance to build high quality faculty in universities, R&D capacity, innovation environment and overall scientific and technical capacity of the SSA region and individual SSA countries.

**61. The economic and financial analysis addresses four key questions: (1) the benefits of developing the capacity of the RCU; (2) why it is important to invest in doctoral training and post-doctoral research and innovation across SSA; (3) the rationale behind investing in a regional initiative; and (4) the major expected benefits and costs related to the scholarship program.** Subcomponent 2.1 focuses on the increase in the availability of highly qualified individuals, with a focus on ASET fields. Beneficiaries are expected to: improve the skills level of the future generations of students through access to better qualified teachers and mentors; improve the quality of the research produced and oriented towards regional needs; and support the development of the private sector, where companies are able to find the required skills they need in the local labor force.

**62. Although RSIF is designed at the regional level, this exercise focused on the impacts of the RSIF in three countries - Kenya, Nigeria and Rwanda.** Currently, four institutions from four countries - Côte d'Ivoire, Nigeria, Tanzania and Senegal – have been selected to host RSIF scholars. Besides that, as citizens from SSA countries who have a Master's degree may apply, it is difficult to establish the countries and right amounts where the benefits and costs will apply. This analysis assumes that the investments and benefits are captured by one country at a time. It captures a few different scenarios, as countries differ in terms of their economic, educational and labor market conditions.

**63. Considering the private returns captured by scholars who decide to invest in a PhD, the Internal Rates of Return (IRR) of the scholarship program were estimated at 11 percent in Kenya, 16 percent in Nigeria, and 22 percent in Rwanda.** These estimates incorporate country differences in the returns to education and discount rates. However, because of the lack of data to disaggregate the returns to education for the different graduate degrees, they are an approximation based on the returns to tertiary education. Finally, the estimated cost of the RSIF project as a share of the public budget allocated to tertiary education is small. As the project represents a regional initiative where the actual funds allocated to each country are not established yet, the estimates focused on the same set of countries included in the cost-benefit analysis. Côte d'Ivoire and Senegal

were included to compensate the lack of information for Nigeria. During the period of project implementation, the annual RSIF costs averaged around 1 percent of the total budget to tertiary education in all countries, except for Rwanda, where the average for the period was estimated at 5.6 percent.

## B. Technical

**64. The Project is both innovative and efficient in design.** The design of the Project focuses on ensuring: (i) long-term sustainability as an independent pan-African program with a strong capacity building component; (ii) a wide range of beneficiaries – from individuals to universities and industry; (iii) a holistic approach of close monitoring and support to its beneficiaries; (iv) versatility in design as it will serve as a readily available and operational platform for governments, foundations, the private sector and other donors to join and contribute to funding scholarships and grants to a specific target group of their choice; and (v) instruments to catalyze high level research into enterprises and industry by commercializing research supported by the Project (and by other initiatives, such as ACEs).

**65. The Project addresses climate change.** Some RSIF host institutions will focus on issues of climate change including biodiversity and food security, and energy leading to development of both human and institutional capacity for research and innovation in these fields, such as the RSIF PhD program at the center for Climate Change Biodiversity and Sustainable Agriculture (CCBAD) in the University Félix Houphouët-Boigny, (Cote d'Ivoire). This center offers training programs on climate change, including: (i) climate change risk analysis, evaluation and management (climatic data, air pollution, water, soil pesticides), (ii) agro-climatology, (iii) modeling, (iv) mitigation strategies for climate change (carbon sequestration), (v) agrobiodiversity and agroforestry system, (vi) dissemination of agricultural technical innovations using information and communication techniques accessible to farmers, and (vii) adaptation of crop calendars to climate variability. In addition, the RCU will be building a knowledge base on climate change through development of the cross-cutting courses on climate change for PhD scholars and faculties. The IT vendors for the project will also require a submission of the disaster and risk mitigation plan and training of the operation staff on emergencies to ensure that the investment by the project will be least affected by the climate change and disaster risks.

**66. The Project incorporates citizen engagement.** Mechanisms to provide feedback on the RSIF program will be incorporated into the RSIF websites of the RCU as well as the host institutions. This feedback will be considered during supervision and when reviewing the project design at midterm review.

## C. Financial Management

**67.** The Bank carried out a financial management capacity assessment of *icipe*, as the RCU with responsibility for the overall coordination, planning, monitoring and evaluation of project activities, including financial management. The objective of the financial management assessment was to determine whether the implementing entity's financial arrangements (a) are capable of correctly and completely recording all transactions and balances relating to the project; (b) facilitate the preparation of regular, accurate, reliable and timely financial statements; (c) safeguard the project's assets; and (d) are subject to auditing arrangements acceptable to the Bank.

**68.** Based on the information available as of the date of this document, the fiduciary risk is assessed as Substantial. From the FM perspective, key risk factors are related to: i) project complexity especially in relation

to the financing of scholarships, research grants and innovation grants that requires the disbursement of funds to host universities/scholars/faculty for them to carry out certain activities and document expenditures. ii) Implementation of those activities would require *icipe* to have in place strengthened capacity and well-developed procedures for the administration of scholarships and research grants, including the tools and procedures to record, control, monitor and report on those activities. Such capacity may not be fully in place at this stage and will only be created as activities under Component 1 advance. (iii) The use of -at least- three sources of financing will pose some challenges to keep orderly segregated accounting records that allow the preparation of reliable financial reports. Finally, (iv) while *icipe* has qualified staff, sound financial management systems, and wide experience with other donors; their lack of familiarity with WB policies and requirements, will require substantive support and monitoring.

69. Mitigating measures have been discussed with *icipe*, and these include: i) designation of specific FM staff that would be trained on WB requirements; ii) the upcoming installation of an Enterprise Resource Planning (ERP) system that would integrate some FM functions and would facilitate preparation of financial reports; iii) strengthening *icipe's* policy and procedures for the management of the three windows (supported through Component 1); and iv) a strengthened audit approach.

70. Upon the successful implementation of the mitigating measures mentioned above, together with the Bank's implementation support, proposed financial management arrangements can be considered acceptable to the Bank.

#### D. Procurement

71. Procurement for the proposed project is carried out in accordance with the 'World Bank Procurement Regulations for Borrowers under Investment Project Financing', dated July 1, 2016 and Revised in November 2017, hereafter referred to as 'Procurement Regulations'. A short form of Project Procurement Strategy for Development (PPSD) has been prepared by the RCU, *icipe*. The PPSD describes the overall project operational context, market situations, implementing agencies capacity and possible procurement risks. The Procurement Plan sets out the procurement selection method, as well as prior and post review thresholds to be followed by the Borrower during project implementation in the procurement of Goods, Works, and Non-consulting and Consulting services.

72. Procurement shall be carried out by *icipe*. Procurement at *icipe* is guided by its Procurement Policy and a well-established Enterprise Recourse System (ERP). It is familiar with framing specifications and contract management with the help of the legal department and carry out procurement of goods, works, nonconsulting services and services. *icipe* has implemented several donor-funded projects in the past and has adequate capacity for procurement related to the project. However, given that this is their first experience in implementing a World Bank funded project, some assistance in early stages will be provided by the World Bank team to guide *icipe* on the New Procurement Framework (NPF) and initial procurements. *icipe* will also be expected to establish systems and mechanisms for addressing and escalating grievances and complaints.

73. An initial Procurement Plan has been developed and agreed covering the activities of the first 18 months of project implementation. This procurement plan will be uploaded to Systematic Tracking of Exchanges in Procurement (STEP) and disclosed on the Bank's external website.

74. Following are the salient procurement arrangements applicable for the Project (details in the Annex 2):

- (1) Procurement under the project will be carried out in accordance with World Bank Procurement regulations for IPF Borrowers July, 2016 and revised in Nov 2017.
- (2) Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, dated October 15, 2006 and revised in January, 2011 and as of July 1, 2016, and other provisions stipulated in the Financing Agreements.
- (3) Procurement to be carried out as per the agreed Procurement Plan entered through STEP.
- (4) The Standard Bidding Documents (SBDs) for Goods and works for National and International Bidding and SRFP for Consultancy shall be used.
- (5) The review thresholds are defined in the Procurement Plan and all activities which are not prior reviewed are eligible to be post reviewed.

75. In view of the regional scope of the project, the multiple levels of implementation, the multitude of stakeholders, staff with procurement proficiency at RCU, the weak procurement capacity at host institutions<sup>25</sup>, and the RCU's limited prior experience in procuring and managing Bank procurement through the New Procurement Framework mainly consultant selection, the procurement mitigated risk is rated as **Substantial**.

#### E. Social (including Safeguards)

76. The Project does not trigger the Bank's social safeguards policies, as no form of involuntary resettlement or impacts on indigenous peoples is envisaged. The overall social impacts of the project are expected to be positive.

#### F. Environment (including Safeguards)

77. No adverse or only minimal environmental impacts are anticipated under the proposed Project, given that no new structures or works are envisaged under the Project, and therefore the environmental or resettlement risks are expected to be negligible. No safeguards policies are being triggered, and the environmental category for the proposed project is C, with no Environmental and Social Management Plan (ESMP) necessary to be prepared. On a precautionary basis, the Operational Manual for participating universities will include a reference to WBG General Environment, Health and Safety Guidelines to promote best practices for activities such as classroom renovations or equipment replacement.

#### G. World Bank Grievance Redress

78. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate

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<sup>25</sup> If any Procurement by the Host universities, the Bank will review their procurement capacity for select host universities.

Grievance Redress Service (GRS), please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit [www.inspectionpanel.org](http://www.inspectionpanel.org).



## II. RESULTS FRAMEWORK AND MONITORING

### Results Framework

#### Project Development Objective(s)

To strengthen the institutional capacity for quality and sustainable doctoral training, research and innovation in transformative technologies in sub-Saharan Africa.

PDO Indicators by Objectives / Outcomes	DLI	CRI	Unit of Measure	Baseline	Intermediate Targets					End Target
					1	2	3	4	5	
<b>Improved institutional capacity for sustainable doctoral training, research and innovation in SSA</b>										
Growth of Regional Scholarship and Innovation Fund			Amount(U SD)	9,000,000.00	14,000,000.00	20,000.00	30,000.00	42,000.00	54,000.00	65,000,000.00
Growth of Regional Scholarship and Innovation Fund (General Fund)			Amount(U SD)	9,000,000.00	14,000.00	18,000.00	25,000.00	33,000.00	42,000.00	50,000,000.00
Growth of Regional Scholarship and Innovation Fund (Permanent Fund)			Amount(U SD)	0.00	0.00	2,000.00	5,000.00	9,000.00	12,000.00	15,000,000.00
Number of PhD scholars that have enrolled in RSIF programs			Number	16.00	56.00	96.00	96.00	96.00	96.00	96.00
Number of PhD scholars that have enrolled in RSIF PhD program (female)			Number	4.00	14.00	30.00	30.00	30.00	30.00	30.00
<b>Improved institutional capacity for quality doctoral training, research and innovation in SSA</b>										



PDO Indicators by Objectives / Outcomes	DLI	CRI	Unit of Measure	Baseline	Intermediate Targets					End Target
					1	2	3	4	5	
Number of implemented networks between host universities and international partners for PhD training and research collaboration			Number	0.00	2.00	5.00	8.00	10.00	10.00	10.00
Number of students/staff that take cross-cutting courses, entrepreneurship and/or research commercialization courses supported by the project.			Number	0.00	0.00	15.00	35.00	60.00	90.00	120.00
Number of research papers submitted by staff members or scholars supported by the project for publication to internationally indexed journals			Number	0.00	0.00	0.00	5.00	15.00	25.00	35.00
Number of research papers submitted by staff members or scholars supported by the project for publication to internationally indexed journals (Female authors or co-authors)			Number	0.00	0.00	0.00	1.00	4.00	7.00	10.00

Intermediate Results Indicators by Components	DLI	CRI	Unit of Measure	Baseline	Intermediate Targets					End Target
					1	2	3	4	5	
<b>Capacity development for growth and management of a scholarship, research and innovation fund</b>										
Permanent Fund established			Yes/No	N	N	Y	Y	Y	Y	Y
PhD scholarship and research grants administration unit established			Yes/No	N	Y	Y	Y	Y	Y	Y
Number of RSIF host institutions			Number	4.00	4.00	10.00	10.00	10.00	10.00	10.00





Number of partner institutions		Number	2.00	3.00	5.00	7.00	9.00	12.00	15.00
Number of RSIF host institutions that start the international accreditation process at the PhD program level or at the institution level		Number	0.00	2.00	4.00	10.00	10.00	10.00	10.00
Number of host universities with an online application system in place		Number	0.00	0.00	1.00	3.00	5.00	7.00	10.00
Number of cross-cutting training courses/workshops for RSIF scholars and researchers		Number	0.00	0.00	2.00	4.00	6.00	8.00	10.00
Number of scientific and technological journals and databases that can be accessed by RSIF scholars and researchers		Number	11,250.00	12,000.00	14,000.00	17,000.00	18,000.00	19,000.00	20,000.00
Innovation grants administration unit established		Yes/No	N	N	Y	Y	Y	Y	Y
Number of firms that co-finance innovation grants		Number	0.00	0.00	2.00	4.00	6.00	8.00	10.00
Number of innovation grants awarded to RSIF host universities		Number	0.00	0.00	6.00	6.00	6.00	6.00	6.00
Number of innovation grants awarded to faculty of RSIF host institutions		Number	0.00	0.00	5.00	5.00	5.00	5.00	5.00
<b>Scholarships and research grants for ASET</b>									
Number of RSIF scholars who graduate PhD programs		Number	0.00	0.00	0.00	0.00	14.00	48.00	82.00
Number of RSIF scholars who graduate PhD programs (female)		Number	0.00	0.00	0.00	3.00	12.00	26.00	
Number of research grants awarded to faculty of RSIF host institutions		Number	0.00	0.00	10.00	10.00	10.00	10.00	10.00
Number of research grants awarded to RSIF scholars		Number	0.00	0.00	0.00	8.00	16.00	16.00	



**Monitoring & Evaluation Plan: PDO Indicators**

<b>Indicator Name</b>	Growth of Regional Scholarship and Innovation Fund
<b>Definition/Description</b>	The indicator measures the financial contributions by governments, private sector companies, foundations, donors, RSIF beneficiaries and other partner organizations to the General or Permanent Fund of the Regional Scholarship and Innovation Fund. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Annual financial statement of the general fund and permanent fund
<b>Methodology for Data Collection</b>	Regional Coordination Unit retrieves the annual financial statement of the general fund and permanent fund from the bank account and compile as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Growth of Regional Scholarship and Innovation Fund (General Fund)
<b>Definition/Description</b>	The indicator measures the financial contributions by governments, private sector companies, foundations, donors, RSIF beneficiaries and other partner organizations to the General Fund of the Regional Scholarship and Innovation Fund. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Annual financial statement of the general fund
<b>Methodology for Data Collection</b>	Regional Coordination Unit retrieves the annual financial statement of the general fund from the bank account and compile as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



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<b>Indicator Name</b>	Growth of Regional Scholarship and Innovation Fund (Permanent Fund)
<b>Definition/Description</b>	The indicator measures the financial contributions by governments, private sector companies, foundations, donors, RSIF beneficiaries and other partner organizations to the Permanent Fund of the Regional Scholarship and Innovation Fund. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Annual financial statement of the permanent fund
<b>Methodology for Data Collection</b>	Regional Coordination Unit retrieves the annual financial statement of the permanent fund from the bank account and compile as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of PhD scholars that have enrolled in RSIF programs
<b>Definition/Description</b>	Total number of scholars that have received RSIF scholarships and have been enrolled in RSIF PhD programs. The targets are cumulative totals. The baseline reflects the scholars that have received RSIF scholarships using government funds
<b>Frequency</b>	Annual
<b>Data Source</b>	RSIF host institutions' RSIF student enrollment data
<b>Methodology for Data Collection</b>	Regional Coordination Unit collects RSIF student enrollment data from RSIF host institutions and compile the information as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of PhD scholars that have enrolled in RSIF PhD program (female)
<b>Definition/Description</b>	Number of female scholars that have received RSIF scholarships and have been enrolled in RSIF PhD programs. The targets are cumulative totals. It is assumed that there will be a growth from 25% of the total number of new scholars enrolled in Year 1 to 40% of the new scholars enrolled in Year 2 as a result of the RCU's efforts to increase female participation in the RSIF PhD programs. The baseline reflects the scholars that have received RSIF scholarships using government funds
<b>Frequency</b>	Annual
<b>Data Source</b>	RSIF host institutions' RSIF female student enrollment data
<b>Methodology for Data Collection</b>	Regional Coordination Unit collects RSIF female student enrollment data from RSIF host institutions and compile the information as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of implemented networks between host universities and international partners for PhD training and research collaboration
<b>Definition/Description</b>	This indicator measures the number of networks that have been implemented between SSA host institutions and international partners (including other African institutions) on areas related to PhD training, research or innovation on topics related to Africa’s development and transformation. Implemented networks mean that there are signed network agreements between SSA host universities and international partners describing the activities to be conducted as a network under the theme where synergies exist. Networks must be made up of at least 4 institutions comprised of RSIF host institution, one African institution (could be another RSIF host institution) and two international partners, at least one from outside of Africa. Networks should address the development of innovative training strategies and methodologies at the PhD level; promote the capacity of host universities to plan and implement academic and nonacademic activities cooperatively; or research, innovation, and value chains challenges for priority sectors of the economy. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	RSIF host universities' signed network agreements with international and regional partners
<b>Methodology for Data Collection</b>	Regional Coordination Unit collects copies of signed network agreements with international and regional partners from RSIF host universities and compile the data as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of students/staff that take cross-cutting courses, entrepreneurship and/or research commercialization courses supported by the project.
<b>Definition/Description</b>	This indicator measures the number of students and staff members in RSIF host institutions who take and complete the cross-cutting training courses/workshops or entrepreneurship and research commercialization courses designed with support from the project. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Online course system and trainers
<b>Methodology for Data Collection</b>	Regional coordination unit collects necessary data from the online course system and trainers directly and compile the information as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit





<b>Indicator Name</b>	Number of research papers submitted by staff members or scholars supported by the project for publication to internationally indexed journals
<b>Definition/Description</b>	This indicator measures the number of research papers submitted by faculty/staff members or scholars supported by the project for publication to internationally indexed journals. The targets represent cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	RSIF host universities who track the submission of research papers by RSIF scholars and faculties.
<b>Methodology for Data Collection</b>	RSIF host universities report to the Regional Coordination Unit with supporting documents.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



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<b>Indicator Name</b>	Number of research papers submitted by staff members or scholars supported by the project for publication to internationally indexed journals (Female authors or co-authors)
<b>Definition/Description</b>	The indicator measures the number of research papers submitted by faculty/staff members or scholars supported by the project for publication to internationally indexed journals. The number of such research paper submissions with female authors or co-authors are measured. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	RSIF host universities who track the submission of research papers by RSIF scholars and faculties.
<b>Methodology for Data Collection</b>	RSIF host universities report to the Regional Coordination Unit with supporting documents.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit.



**Monitoring & Evaluation Plan: Intermediate Results Indicators**

<b>Indicator Name</b>	Permanent Fund established
<b>Definition/Description</b>	This indicator measures if the Permanent Fund is legally established with the necessary bylaws, statutes, governance, structure and investment policy in place, and is ready to receive capital.
<b>Frequency</b>	Annual
<b>Data Source</b>	Legal documents and other relevant governance documents and investment policy documents
<b>Methodology for Data Collection</b>	Regional Coordination Unit collects necessary legal and operational documents from those who will register the fund.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



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<b>Indicator Name</b>	PhD scholarship and research grants administration unit established
<b>Definition/Description</b>	This indicator measures if the unit to administer and manage the RSIF PhD scholarships and research grants is established and operational, i.e. the unit is staffed and equipped to carry out the activities related to the PhD scholarship and research grants programs.
<b>Frequency</b>	Annual
<b>Data Source</b>	PhD scholarship and research grant operational manual, presence of necessary staff including administrators of scholarship and research grant, presence of functional office, and availability of bank account for grant disbursement
<b>Methodology for Data Collection</b>	Regional Coordination Unit collects all data described in the data source and compile it as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of RSIF host institutions
<b>Definition/Description</b>	This indicator measures the number of institutions competitively selected and evaluated by an international independent evaluation committee for the RSIF to serve as an RSIF host institution and that has signed agreements with the RSIF Regional Coordination Unit. The target are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Signed agreements between host institutions and Regional Coordination Unit
<b>Methodology for Data Collection</b>	Regional Coordination Unit compiles all signed agreements with host institutions and compile a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of partner institutions
<b>Definition/Description</b>	<p>This indicator measures the number of partner organizations (international universities, research organizations, private sector companies) that have been selected to partner with RSIF host institutions through a standardized selection protocol and that have signed agreements with the RSIF Regional Coordination Unit. The baseline includes the Korea Institute of Science and Technology and Maastricht University.</p> <p>The targets are cumulative totals</p>
<b>Frequency</b>	Annual
<b>Data Source</b>	Signed agreements with partners
<b>Methodology for Data Collection</b>	RSIF host universities report to the Regional Coordination Unit with signed agreements
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of RSIF host institutions that start the international accreditation process at the PhD program level or at the institution level
<b>Definition/Description</b>	This indicator measures the number of RSIF host institutions that start the international accreditation process either at the RSIF PhD program level or at the university level. The definition of "start" means that the RSIF host institutions identify international accreditation agency, sign the contract with accreditation agency and complete the self-evaluation for the accreditation process.
<b>Frequency</b>	Annual
<b>Data Source</b>	Contract signed with the accreditation agency and self-evaluation report of the RSIF host institutions.
<b>Methodology for Data Collection</b>	Regional Coordination Unit asks RSIF host universities to report on the status of the international accreditation process and submit supporting documents.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of host universities with an online application system in place
<b>Definition/Description</b>	<p>This indicator measures the number of RSIF host universities that have a operational online application system for their application process wherein scholars can submit all details and documents required for admission through an online portal. An operational online application system is one that has been tested and is ready to be launched to receive application submissions.</p> <p>The targets are cumulative totals</p>
<b>Frequency</b>	Annual
<b>Data Source</b>	Online application system
<b>Methodology for Data Collection</b>	Regional Coordination Unit will receive the report generated from the online application system for each RSIF host institution.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit





<b>Indicator Name</b>	Number of cross-cutting training courses/workshops for RSIF scholars and researchers
<b>Definition/Description</b>	This indicator measures the number of courses or workshops on cross-cutting, interdisciplinary topics that are designed and operational and can be taken by RSIF scholars and researchers. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Course or workshop catalogue and syllabus
<b>Methodology for Data Collection</b>	Regional Coordination Unit will compile all available courses and workshops into a report
<b>Responsibility for Data Collection</b>	Regional Coordination Unit
<b>Indicator Name</b>	Number of scientific and technological journals and databases that can be accessed by RSIF scholars and researchers
<b>Definition/Description</b>	This indicator measures the number of scientific and technological journals, databases or publications that the RCU has made accessible to RSIF PhD scholars and research and innovation grantees. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Journal or database subscription confirmation
<b>Methodology for Data Collection</b>	Regional Coordination Unit will compile the journal or database subscription confirmations in a report
<b>Responsibility for Data Collection</b>	Regional coordination unit



<b>Indicator Name</b>	Innovation grants administration unit established
<b>Definition/Description</b>	This indicator measures if the unit to administer and manage the innovation grants window of the RSIF is established and operational, i.e. the unit is staffed and equipped to carry out the activities of the innovation grants program.
<b>Frequency</b>	Annual
<b>Data Source</b>	Operational manual for innovation grant administration, staff for innovation grant, adequately equipped office for innovation grant administrator, available bank account for disbursing innovation grant
<b>Methodology for Data Collection</b>	Regional coordination unit collects all the information in the data source and compile a report.
<b>Responsibility for Data Collection</b>	Regional coordination unit
<b>Indicator Name</b>	Number of firms that co-finance innovation grants
<b>Definition/Description</b>	The indicator measures the number of companies that provide co-financing (including in-kind) for RSIF innovation grants. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Signed agreement on co-financing by the private sector
<b>Methodology for Data Collection</b>	RSIF host universities report to the Regional Coordination Unit with signed agreements
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of innovation grants awarded to RSIF host universities
<b>Definition/Description</b>	This indicator measures the number of innovation grants awarded to RSIF host universities when the selection result is announced. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Financial statement that shows the disbursement of innovation grant to RSIF host institutions and recipients' documented acknowledgement
<b>Methodology for Data Collection</b>	RSIF Innovation Grants Administration Unit collects the necessary documents including financial statement, acknowledgement from the recipients and other supporting documents and compile the data as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of innovation grants awarded to faculty of RSIF host institutions
<b>Definition/Description</b>	This indicator measures the number of innovation grants awarded to faculty of RSIF host universities for proposals presented in partnership with the private sector when the selection result is announced. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Financial statement showing the disbursement of the innovation grant to faculty and the recipients' documented acknowledgement
<b>Methodology for Data Collection</b>	RSIF Innovation Grants Administration Unit collect necessary documents including financial statement, recipients' acknowledgement and other supporting documents to compile the data as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit
<b>Indicator Name</b>	Number of RSIF scholars who graduate PhD programs
<b>Definition/Description</b>	This indicator measures the number of scholars who graduate from the RSIF PhD programs at RSIF host institutions. The targets are counted cumulatively. The annual targets reflect a 5% annual dropout rate.
<b>Frequency</b>	Annual
<b>Data Source</b>	RSIF host universities who track the progress of scholars
<b>Methodology for Data Collection</b>	Regional Coordination Unit collects data from RSIF host universities
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of RSIF scholars who graduate PhD programs (female)
<b>Definition/Description</b>	This indicator measures the number of female scholars who graduate from RSIF PhD programs at RSIF host institutions. The targets are counted cumulatively. The annual targets reflect a 5% annual dropout rate.
<b>Frequency</b>	Annual
<b>Data Source</b>	RSIF host universities who track the progress of scholars
<b>Methodology for Data Collection</b>	Regional Coordination Unit collects data from RSIF host universities
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



<b>Indicator Name</b>	Number of research grants awarded to faculty of RSIF host institutions
<b>Definition/Description</b>	This indicator measures the number of research grants awarded to faculty of RSIF host institutions when the selection result is announced. This included research grants financed through the pilot program using IDA grant funds and through funds from the Government of Korea. The targets are cumulative totals
<b>Frequency</b>	Annual
<b>Data Source</b>	Financial statement showing the disbursement of research grant to the faculty of RSIF host institutions and recipients' documented acknowledgement
<b>Methodology for Data Collection</b>	RSIF PhD scholarship and research grants administration unit collects necessary documents, including financial statement, recipients' acknowledgement and other supporting documents and compile the data as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



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<b>Indicator Name</b>	Number of research grants awarded to RSIF scholars
<b>Definition/Description</b>	This indicator measures the number of research grants awarded to RSIF scholars when the selection result is announced. The targets are cumulative totals.
<b>Frequency</b>	Annual
<b>Data Source</b>	Financial statement showing the disbursement of research grants to scholars and recipients' acknowledgement.
<b>Methodology for Data Collection</b>	RSIF PhD scholarship and research grants administration unit collects necessary data including financial statement and recipients' acknowledgement and compile the data as a report.
<b>Responsibility for Data Collection</b>	Regional Coordination Unit



## ANNEX 1: DETAILED PROJECT DESCRIPTION

### COUNTRY : Africa

#### Africa Regional Scholarship and Innovation Fund for Applied Sciences, Engineering and Technology

- 1. The Partnership for skills in Applied Sciences, Engineering and Technology (PASET)** initiative was launched in 2013 by African governments and private sector, with facilitation by the World Bank, as a response to Africa's deficit in a skilled labor force in priority sectors of Applied Sciences, Engineering and Technology (ASET) fields. This partnership recognized the critical need to strengthen science, engineering and technology capabilities for the socio-economic development of sub-Saharan Africa (SSA), and favored a regional approach for achieving this. PASET serves as a convening platform for SSA governments, private sector and educational institutions, development partners, multinationals who are investing in Africa and new country partners from Asia and Latin America.
- 2. To achieve its goals, PASET has undertaken several national and regional level activities, of which the Regional Scholarship and Innovation Fund (RSIF) is the flagship initiative.** The RSIF's objective is to contribute towards the training of a critical mass of PhD and post-doctoral candidates in ASET fields for priority sectors in SSA and build the capacity of a core of African universities to train these candidates. The RSIF will also build capacity in the region to sustainably support those PhD graduates beyond their training as they go into academia, industry, or become entrepreneurs through research and innovation grants. The ultimate outcome is for the RSIF to build and increase the R&D workforce for both academia and industry in the SSA region.
- 3. RSIF supports universities to establish a high-quality training and research environment and develop their institutional capacity for the benefit of the whole region.** RSIF's pan-African, focused and sustainable approach contributes to a solution to the challenge of building high quality research expertise in selected host universities in SSA countries that would benefit the whole region through its graduates and research and innovation results. Furthermore, because of its regional scope, RSIF targets funding from governments, private sector, cooperation agencies and international donors.
- 4. The Project builds on the established framework of the PASET RSIF to finance scholarships and research and innovation grants in ASET fields in Africa,** which will contribute to raising to international levels the quality of doctoral training, research and innovation in selected African universities in ASET areas. It is envisioned that this Fund will grow to finance activities beyond the duration of the Project and help create the needed nurturing environment for research and development in SSA. A regional approach would be more effective in bringing together organizational capital to attract funding from diverse sources including governments, private sector, foundations and development partners. It would also be conducive to setting up a fund that will be managed with high levels of transparency and fiduciary responsibility. In addition, a pan-African fund would complement the efforts of national research funds by financing research in priority areas to build research capacity, creating a fertile environment for innovations, and forging partnerships with industry and international partner universities
- 5. The priority thematic areas are selected based on critical needs on the continent,** and specifically as agreed on by the countries that are funding the RSIF. Through skills needs assessments, other analytical work and consultations with SSA governments including Senegal, Ethiopia, and Rwanda, 10 economic sectors have





been identified: transportation; manufacturing; energy; petroleum; pharmaceuticals; health; mining, mineral & materials; information & communication technology; agriculture; and commerce & financial services. One of the inputs included the selection criteria of the Country ASET Action Plan: (i) potential for growth (the country has a competitive advantage/resources in these sectors), (ii) potential for better quality employment (these sectors absorb or already absorbing a lot of labor), and (iii) strategic importance of the country (the country wishes to develop these sectors for the future).

**6. The proposed Project will build the institutional capacity to manage and grow RSIF for sustained results.**

The Project will have two main components: (i) capacity development of the RCU to manage the fund; and (ii) financing for its core activities.

**7. Component 1: Capacity development for the operation and management of the Scholarship, Research and Innovation Fund (IDA Regional Grant US\$15 million)**

8. This component will support strengthening of the RCU to become a scientific, technological and innovation capacity builder for PhD programs and universities in SSA in the fields of applied sciences and engineering that support transformative technologies, to make it capable of operating and growing RSIF efficiently and sustainably.

**9. Subcomponent 1.1: Capacity building for managing and growing the RSIF General Fund and setting up a RSIF Permanent Fund. (US\$2.8 million):** This sub-component will support the design and operationalization of an endowment fund to finance scholarships, research and innovation grants in Africa on a sustainable basis. The fund will be a critical instrument for leveraging funding on a regional scale and bringing together organizational capital to attract funding from diverse sources including governments, private sector, foundations and development partners. In addition, a pan-African fund would complement the efforts of national research funds to build research and innovation capacity, creating a fertile environment for innovations and transformative technologies, and facilitate partnerships with industry and international partner universities. This subcomponent will finance:

- i. The design of a Permanent Fund including its statutes, governance, structure and funding strategies;
- ii. Studies necessary for successful implementation and guaranteeing the sustainability of the Permanent Fund, including studies related to mechanisms based on solidarity for the beneficiaries to return to the Permanent Fund part of the benefits received by: scholars once they graduate and find a job; and/or universities and industry once they have benefited from results from research and innovation projects financed by RSIF;
- iii. Activities to build the RCU's capacity for fund raising from a variety of sources to enhance the general and the permanent funds. This will include strengthening the existing RSIF fundraising strategy to identify a greater variety of funders such as foundations, corporate social responsibility wings of corporations, international companies, impact investors, and development partners, as well as hosting forums that convene diverse stakeholders to secure both financial and non-financial contributions. The project will also finance a fundraising specialist housed within the RCU and/or trainings for staff in fundraising and outreach strategies, business development, and grant proposal writing as needed. The fundraising specialist will also identify potential events and conferences to develop necessary contacts and network for the fundraising. In addition, the project will also strengthen the RCU's capacity for communicating and disseminating the progress of the RSIF program to attract more funding.



- iv. Meetings of the governance bodies of PASET on issues related to RSIF, including the Board of Directors, the EC and CAG. Various consultations will be conducted, especially to define the governance structure and design of the permanent fund.

10. This subcomponent will also support activities to improve financial management of the RCU, such as:

- i. Design and implementation of robust systems for funds management, including endowments: The project will support the strengthening of the financial systems of the RCU to ensure that robust systems are in place to receive funding from a variety of stakeholders including governments, donors, private sector; and alumni; host a permanent fund; and disburse funds regularly to the scholars, grantees, and universities. The sub-component will also finance design of methods of effective institutional assessment of host organizations, monitoring funds utilization and strengthen capacity to conduct audits of institutions.
- ii. Design strategies/courses to provide more efficient procurement and financial management support to RSIF host organizations: The project will support the development of strategies on effective procurement and financial management practices to support the strengthening of systems at the RSIF host institutions. These systems will support the overall quality development of RSIF host institutions and strengthen their fiduciary systems.

11. **Subcomponent 1.2: Capacity development for the operation and management of doctoral training scholarships in selected African universities and research grants in ASET fields (US\$3.7 million).** This subcomponent will support setting up of a PhD scholarship and research grants administration unit at the RCU, to design and implement strategies to contribute to the improvement of RSIF PhD programs and to operate and manage the training of doctoral students, and manage research grants, in ASET fields that support transformative technologies in priority sectors of the region. Specifically, this subcomponent will finance the following activities:

- i. Development and maintenance of all the managerial and ICT processes and systems required by the RCU for the scholarships and their interfaces in host universities. All the IT vendors procured under this component will need to submit a disaster recovery plan to mitigate potential climate change and natural hazard risks and will conduct a training for the system operators on emergencies. The activity also includes the maintenance of a dedicated RSIF website in English and French containing updated information on scholarships, the RSIF and its activities, establishment and maintenance of a database system to collect and manage up-to-date information of the RSIF PhD scholars, host institutions and alumni, and technical support to host universities for the establishment of online applications systems. The project will also finance the design and set up of an RSIF alumni network that will create an RSIF community of scholars, researchers and innovators and offer an additional avenue of support and finance for the program.
- ii. Improve the design of and manage, under the guidance of the EC, the selection processes for scholars, host universities and international partners: To develop the RSIF into a prestigious program, it is essential to have competitive and rigorous selection processes at each level of its operation. The project will finance technical assistance to improve the current processes for the selection of the scholars and host universities using best practices and incorporating lessons learned from the first round of scholarships. The technical assistance will also support the development of a rigorous selection process for international partner universities and organizations where RSIF scholars will spend part of their PhD training to pursue “sandwich programs” or carry out research. In addition, this subcomponent will finance the organization of trainings to help host universities evaluate and



strengthen their admissions processes. Furthermore, the activity will support the design and management of a competitive selection process for the research grants under the guidance of the EC.

- iii. Improve mechanisms and design strategies for increasing participation of women in PhD programs and research in ASET fields in SSA: The project will support the RCU with the development of communication, marketing and recruiting strategies to achieve greater female participation in PhD programs and research in ASET fields. This could include actions such as tailoring the program websites and social media presence, piloting various recruiting initiatives such as providing opportunities for female RSIF scholars to speak at youth events and career seminars, and organizing and supporting opportunities for female researchers to present their research. The RCU will also share and coordinate these strategies across the host institutions to raise the profile of RSIF program through RSIF host institutions and encourage the recruitment and development of female scientists. In addition, this subcomponent will finance a study to understand the challenges and barriers faced by young female PhD scholars and researchers in balancing career and family commitments.
- iv. Design and implementation of monitoring and evaluation strategies of the scholarship program and research grant program, including a comparative analysis with other universities in the SSA region leveraging the benchmarking initiative under the PASET: The project will support the development of sound monitoring and evaluation mechanisms of the scholarship and research grants programs to ensure funds disbursements to scholars, grantees and universities take place efficiently, RSIF scholars and grantees are progressing successfully through their programs and research, host universities are providing adequate support to scholars, among other aspects of the program. Furthermore, the project will support a preparatory study and workshops for conducting a comparative analysis through the benchmarking initiative under PASET to assess the impact provided by the scholarship program against other universities in SSA. The preparatory activity includes workshops with target universities to train on data collection methodology and analysis.
- v. Pilot implementation of research grants: To strengthen the effectiveness of the capacity building activities, the project will finance five grants in year 2 of the project to support research projects in ASET fields related to transformative technologies aligned with the needs of the priority sectors. Grants will be assigned to faculty of RSIF host institutions involved in a PhD program with RSIF scholars through open competitive calls and will be selected by international selection committees to ensure independence and high quality and relevance of projects. The selection criteria of the grants will include application to transformative technologies and a workshop will be held for the applicants to learn about these technologies and potential applications (see component 2.2 for procedures).

**12. Subcomponent 1.3: Capacity development for improving quality of PhD programs and research in ASET fields (US\$6.1 million).** This subcomponent will aim to build the capacity of host universities and the RCU to improve the quality of PhD programs and of research conducted in RSIF universities through several capacity building activities described below:

- i. Support the design of cross-cutting PhD courses, training courses for researchers and institute mentoring programs: The project will finance the design and organization of cross-cutting PhD courses and training courses or workshops for RSIF PhD scholars, faculty advisors and research grantees. The workshops and courses will include topics such as transformative technologies, soft skills, responsible conduct of research (ethics), best practices in science communication and dissemination, peer-reviewed publications and seminars, best practices in peer-reviewing scientific manuscripts, new and innovative pedagogical methods of teaching ASET fields in universities, finding and using academic



literature, grant proposal writing to apply for research grants, research planning and delivery, laboratory safety, and new research methods. The RCU will also facilitate the development of training on climate change to ensure that the scholars, faculties, and hosting institutions can contribute to climate change relevant issues through their research. In addition, to support the RSIF scholars and research grantees and facilitate their success, the project will finance technical assistance for the RCU to develop mentoring programs and organize workshops. The mentoring program will work with the PhD supervisors at each of the host institutions to help them effectively support the RSIF PhD scholars. Similarly, it will support research grantees with more hands-on guidance and support. Workshops will help equip mentors with the skills, tools, and strategies to build a strong partnership with their doctoral students to support their professional development and progress and to build academically sound and relevant research groups.

- ii. Support the creation and implementation of academic networks among host institutions and international partners participating in RSIF as well as scholars and researchers: This sub-component will finance the development of academic networks among the RSIF SSA host institutions and the RSIF international partners to promote the capacity of universities to plan and implement academic activities to improve PhD programs (such as curricular reform, sharing of infrastructure, link to industry and development of soft skills, among others). It will also support the creation and implementation of research networks for researchers participating in RSIF by financing the organization of regular networking opportunities to promote interactions with other researchers in similar fields and based in other institutions within and outside the SSA region who may be part of other prestigious programs.
- iii. Development of standardized MoUs and agreements between SSA host universities and international partner institutions: The project will provide support to the RCU to develop standardized MoUs and agreements that can be used by the RSIF host universities and international partners to reduce costs of collaboration and help develop frameworks for intellectual property for the collaborations.
- iv. Support RSIF host universities to seek international accreditation of PhD programs and institutional accreditation: This activity entails support for the RCU to assist RSIF host universities to get their PhD programs and institutions accredited including designing and conducting short trainings or producing informational guidelines on the processes and requirements for international accreditation that will raise the quality of the programs.
- v. Document, disseminate and promote the implementation among host institutions of good international practices in PhD training: This activity will support the RCU with conducting research and gathering information on good global practices in PhD training. It will also support the RCU to subsequently communicate the information and strategies to incorporate the global best practices to the host institutions in order to raise the quality of the PhD programs and create networking opportunities for the various participating institutions.
- vi. Increase the access to scientific, technological and innovation publications to the RCU and RSIF researchers and PhD scholars: This activity will support subscriptions to international scientific journals, publications, databases and online libraries that can be made available to RSIF scholars, researchers and faculty supervisors to enable them to access the latest information and cutting-edge knowledge in their respective fields.

**13. Subcomponent 1.4: Capacity development for the operation and management of innovation grants (US\$2.4 million).** The RCU will set up an innovation grants administration unit to manage innovation grants. Specific activities include:



- i. Development and implementation of all the managerial and ICT processes and systems required by the RCU for the innovation grants: This activity will finance technical assistance to help define and develop the selection process for the innovation grantees. It will also support the development and maintenance of all necessary ICT processes and systems including a website in English and French for the innovation grants.
- ii. Improve the innovation and entrepreneurship capacity within the RCU so that it is able to transfer best practices in this area to other participating RSIF organizations. The RCU will conduct various studies and develop relevant contacts to create a knowledge base. The knowledge transfer would be conducted through online courses, workshops, invitation of guest lectures and innovation curriculum development support for the RSIF host institutions. The topics range from entrepreneurship and business model development, Intellectual Property (IP) office development, IP policy, business incubation, design thinking, market research, marketing, finance, business operation, fund raising and partnerships.
- iii. A scoping exercise to identify existing incubators, accelerators and tech hubs for potential partnership on capacity development and innovation. This study will help identify organizations to partner with and those which could help the capacity development of host universities in the future. The RCU will develop a database for contacts and develop relationships with relevant organizations through face to face and virtual meetings.
- iv. A background study on best practices for IP office establishment and IP policy of host university countries. Since legal and business environment is crucial for a successful business incubation, a background study would be conducted to create a knowledge base in the RCU to be able to advise host universities and PhD scholars in the future. Various global models will be studied, which could include study visits.
- v. Conduct of scoping exercise to identify professional network, conferences, and competitions on innovation and entrepreneurship as well as venture capital and investors for Africa. This exercise will help the RCU understand major innovation and entrepreneurship players in Africa, major conferences and competitions that scholars and faculty can attend to pitch their ideas, and interested investors to approach in the future. The RCU can also attend the networking events, online forum, and conferences as well as subscribe to newsletters to develop relevant contacts to be used in the future.
- vi. Design and implementation of monitoring and evaluation strategies of the innovation grants.
- vii. Pilot implementation of innovation grants: To strengthen the effectiveness of the capacity building activities, the project will finance a few innovation grants as a pilot. It will finance two types of innovation grants: (i) Six grants of US\$50,000 to support the development of innovation-enabling environments in RSIF host institutions. Institutions can use the grant to create entrepreneurship and innovation programs such as guest lecture series, entrepreneurship courses, mentoring, and networking events in collaboration with existing university/non-university-based incubators and innovation hubs in SSA which already run such programs. The grant will not support physical infrastructure developments. There will be a call for proposals in the second year of the project and grantees will be selected competitively. Host institutions will need to submit a proposal describing their plan and budget focusing on ways to develop the capacity of faculty and RSIF scholars to commercialize their research; and (ii) Five grants of a maximum of US\$50,000 will be awarded competitively in year 2 to the proposals submitted by the faculty of RSIF host universities in partnership with private sector. Funds can go to industry and faculty involved in the RSIF and will be disbursed in two payments, an initial payment of 50 percent upon selection and a second payment of 50 percent after one year, subject to evaluation of results. In any case, the industry partner needs to



co-finance the proposal. The aim for this grant is to incentivize university-industry partnership development and provide faculty with an opportunity to commercialize their research with support from the industry. The partnership should be facilitated by the innovation grant administrator as well as RSIF host institution. The innovation grant administrator can use the industry network of the countries where RSIF host institutions are located to inform the private sector, including small and medium enterprises (SMEs) on this grant opportunity to facilitate matching between faculty and industry. Once the grant is awarded, faculty and industry members are encouraged to participate in the entrepreneurship and innovation program at the RSIF host institution to receive necessary support required. The IP rights of this innovation proposal need to be discussed at the time of the submission of the proposal. The proposal is also encouraged to include the application of transformational technologies.

Table 1: Innovation Grant Cost Breakdown

Innovation Grants							
Year	1	2	3	4	5	6	Total
No. of RSIF host universities receiving type (i) grants	-	6	-	-	-	-	6
Disbursements type (i) grants to RSIF host universities	-	US\$300,000	-	-	-	-	US\$300,000
No. of faculty + industry receiving type (ii) grants	-	5	5 (continuing from the previous year)	-	-	-	5 proposals in total (1 proposal receives 2 installments for 2 years)
Disbursements type (ii) grants to RSIF faculty + industry	-	US\$125,000	US\$125,000	-	-	-	US\$250,000
<b>Total Disbursements</b>	-	<b>US\$425,000</b>	<b>US\$125,000</b>	-	-	-	<b>US\$550,000</b>

14. Component 2: Scholarships and Research Grants for ASET (US\$9 million from Government of Korea).

15. This component, financed by a US\$9 million<sup>26</sup> contribution from the Government of Korea administered by the Bank, will provide financing for scholarships and research grants in ASET fields in Sub-Saharan Africa. SSA countries have shown interest in contributing funds to RSIF either through their own resources or through regional IDA credit. Some of these contributions may also be channeled through regional IDA projects, for instance the proposed Africa Centers of Excellence III, which is currently under preparation.

<sup>26</sup> After accounting for cost recovery fees





16. **Subcomponent 2.1: Training of doctoral students in ASET fields (US\$7.25 million from Government of Korea)** to support the development of priority sectors for the region. The scholarships will finance 3-4 year PhD training programs for citizens of SSA countries at competitively selected host universities in Africa. Scholarships will include “sandwich” training that will allow students to complete part of their doctoral program at Korean partner institutions or companies

17. Host universities are African universities or research centers capable of providing quality PhD education that is relevant to Africa’s development. These universities are competitively selected following a two-stage process managed by the RCU. In the first stage, the RCU will issue an open call for applications with requests for short proposals from interested universities. An evaluation committee comprised of independent experts will assess the proposals and identify a short-list of institutions. In the second stage, the short-listed institutions will submit more detailed proposals and following a desk review of the applications, in-person field visits to the applicant universities will be conducted by the independent evaluation committee, where possible, with facilitation by the RCU. Virtual meetings with host institutions will be held if in-person visits are not possible. Finally, the independent evaluation committee will recommend a final list of selected institutions which will be submitted to the PASET EC and Board of Directors for approval and decision. For the first year, four host universities were selected among the Africa Centers of Excellence (ACE) in SSA and went through PASET’s rigorous competitive selection process and have been approved by the PASET Board of Directors to provide PhD training to RSIF scholars. A second round of selection will be initiated during the first year of project implementation and will be open not only to ACE but to all SSA universities that comply with a set of quality and relevance standards and pass the rigorous competitive selection process. It is envisioned that six additional universities will be selected to complete a total of 10 host universities throughout SSA.

18. Scholars will be selected on a competitive basis with priority given to meritorious and promising young African faculty without PhDs and females. Scholars will first need to be accepted by the host universities. They will then go through a stringent competitive selection process conducted by an international independent committee that will ensure that the best students with the strongest research potential and leadership capabilities are admitted into the RSIF program. The final list will be validated by the PASET EC. RSIF student selection will be guided by the following principles to ensure success, academic accountability, programmatic transparency, global recognition and sustainability of the RSIF scholarship program:

- (a) **Merit-based:** The academic success, leadership capability, and commitment are key areas for the selection of RSIF scholars. The primary evaluation factor that will determine acceptance to the scholarship program is merit, followed by the other criteria. Within this merit-based scheme, priority will be given to:
  - i. Junior faculty/academic staff in priority areas.
  - ii. Students from underrepresented groups, for example women and students from the poorer regions and rural areas.
- (b) **Transparency:** The selection process will follow an established guideline, outlined clearly in the Operational Manual and available to all stakeholders allowing full transparency and accountability.
- (c) **Donor Incentive-Based:** For the financial sustainability of the program, donor preferences in terms of profiles of scholars will be given a priority in the selection process. This may include incentivizing SSA countries that have made contributions to the RSIF in order to encourage others.
- (d) **Africa development-focused:** The selection process will take into consideration measures that will help the program to have the highest impact in transforming the continent, based on selected priority



development areas.

19. The selection process will be based on an algorithm that considers the following variables:

- Number of available positions given the capacity of the host institutions.
- Number of applicants, country of origin and area of study.
- Availability of funds from both the General Fund and the returns of the Permanent Fund.

20. Scholarships provide financial support for up to 4 years of PhD training amounting to about US\$85,600 (US \$21,400 per year) per scholar.<sup>27</sup> The breakdown of the annual expenses per scholar is shown in Table 2 below. A total of 80 students would benefit from the project (assuming a dropout rate of 5%).

**Table 2: Scholarship Grant Cost Breakdown (annual per scholar)**

Scholarship Expense	Amount (USD)	Assumptions/Notes
Stipend	US\$14,400	<ul style="list-style-type: none"> <li>• \$1,200/month paid quarterly directly to scholar.</li> <li>• Funds are for travel to/from home country, health insurance and other living expenses.</li> <li>• No additional funding is available for dependent support</li> <li>• Payment is contingent on receipt by the RCU of satisfactory scholar progress reports from the host university</li> </ul>
Tuition	US\$3,000	<ul style="list-style-type: none"> <li>• Paid directly to the host university</li> <li>• Tuition rates are approved by the PASET Board of Directors on an annual basis</li> </ul>
Supervisor research support	US\$4,000	<ul style="list-style-type: none"> <li>• This is intended as an incentive for supervisors</li> </ul>
Total	US\$21,400	<ul style="list-style-type: none"> <li>• The total does not account for inflation and exchange-rate fluctuations</li> </ul>

21. Based on the Korean government’s priority, at least half of the funding for this sub-component will be used for the selected RSIF scholarship students in the African host universities who will join in “sandwich” programs with Korean institutions or universities. For these students, all costs including, where applicable, tuition fees in Korean institutions and stipends for staying in Korea, will be covered by the sub-component. The remaining financing will go to other RSIF scholarship students in the African host universities, who may join ‘sandwich’ programs in RSIF partner universities in other countries. In the latter case, the Korean Trust Fund will cover the costs (tuition, stipend etc.) in the African host universities, and not the cost of studying in the sandwich programs in other partner universities. The relative distribution of the students who study in partner universities in Korea and those who study in other countries will be detailed during the selection for the sandwich program. In order to enhance the partnership with Korea, the selection committee of RSIF host universities as well as of PhD scholars may include minimum two Korean experts for each committee.

22. **Subcomponent 2.2: Research grants (US\$1.75 million from Government of Korea).** These grants will

<sup>27</sup> The scholarship amount of US\$85,600 per scholar is an indicative cost. It is expected that this cost will reduce if partner universities assume a part of the cost of the scholar’s training.





support research projects in ASET fields aligned with the needs of the priority sectors. There will be two types of grants: (i) grants to faculty of RSIF host institutions involved in a PhD program with RSIF scholars; and (ii) grants to RSIF graduates who obtain a post-doctoral or permanent position in an academic institution or research center in SSA. In both cases the proposal requires endorsement and co-financing by the institution. Grants will be assigned through open competitive calls and recipients will be selected by international selection committees to ensure independence and the high quality and relevance of projects.

23. A call for proposals for type (i) grants will be made the second year of the project (see Table 3) and will finance research projects in ASET fields aligned with the needs of the priority sectors with a duration of at most three years and for a total amount of at most US\$90,000, presented by faculty of RSIF host institutions involved in a PhD program with RSIF scholars. These grants will cover research expenses such as: (a) expenses associated with visiting academic staff and attending short courses by the faculty involved in the PhD program; (b) software, hardware and research equipment; (c) inputs including research materials and tests; (d) minor constructions and remodeling of laboratories; (e) knowledge transfer and dissemination; and (f) cost of protection of knowledge (patents and similar copy rights instruments). It is expected that five of these grants will be awarded. Proposal requires endorsement and co-financing by the host university and participation of at least one international partner institutions.

24. Calls for proposals for type (ii) grants will be made the fourth and fifth year of the project (see Table 3) and will finance research projects in ASET fields aligned with the needs of the priority sectors presented by graduating RSIF scholars that hold a permanent or post-doctoral position in an academic institution or a research center in SSA. Grants will be awarded for a total amount of at most US\$80,000. The proposals should express clearly the continuity of the research the scholar has been doing in his or her PhD thesis. These grants will cover research expenses such as: (a) expenses associated with visiting academic staff and attending short courses by the faculty involved in the PhD program; (b) software, hardware and research equipment; (c) inputs including research materials and tests; (d) minor constructions and remodeling of laboratories; (e) knowledge transfer and dissemination; and (f) cost of protection of knowledge (patents and similar copy rights instruments). It is expected that 16 of these grants will be awarded. Table 3 presents the projected number of research grants supported by the Project and the corresponding costs during the 6 years.

**Table 3: Research Grants Allocation**

Research Grants							
Year	1	2	3	4	5	6	Total
Type (i) Grants	-	5	-	-	-	-	5
Disbursements Type (i) Grants (US\$)	-	US\$450,000	-	-	-	-	US\$450,000
Type (ii) Grants	-	-	-	8	8	-	16
Disbursements Type (ii) Grants (US\$)	-	-	-	US\$640,000	US\$640,000	-	US\$1,280,000



Research Grants							
Total disbursements		US\$450,000	-	US\$640,000	US\$640,000	-	\$1,730,000



## ANNEX 2: IMPLEMENTATION ARRANGEMENTS

COUNTRY : Africa

Africa Regional Scholarship and Innovation Fund for Applied Sciences, Engineering and Technology

### Project Institutional and Implementation Arrangements

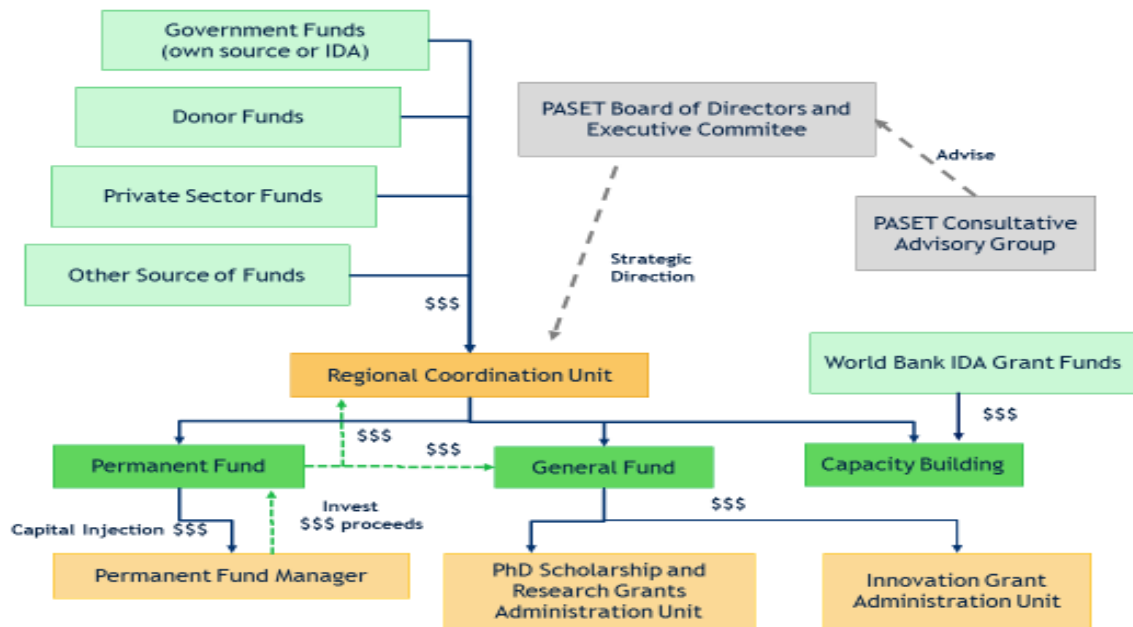
1. The implementation of the RSIF project is structured in a tiered fashion with the following primary entities interacting to administer and deliver project activities:

- (a) **Regional Coordination Unit:** The RCU will be the primary implementation body tasked with the overall coordination planning, monitoring and evaluation of project activities. With a leading role in the implementation of the RSIF, the RCU is responsible for ensuring that the project goals are reached. The RCU will receive the IDA grant funds and is expected to be the organization which will manage future contributions from governments, private sector organizations and other sources, administering them under the oversight of the PASET governance bodies. The RCU will be hosted at the International Centre of Insect Physiology and Ecology (*icipe*) based in Nairobi, Kenya.
- (b) **PASET governance bodies:** The PASET governance bodies, comprising the PASET Board of Directors and the PASET EC will provide strategic direction for implementation of the RSIF project by the RCU. The Board of Directors will be responsible for the overall strategic direction and vision of the RSIF while the EC will interact with the RCU more regularly, monitoring the regular progress of activities and providing overall guidance. The PASET CAG will provide guidance to the Board of Directors and EC on regional priorities, goals and technical aspects of the RSIF.
- (c) **RSIF Permanent Fund Manager:** The RSIF Permanent Fund Manager will be responsible for setting up, managing and growing the Permanent Fund under the supervision of the RCU by making profitable and smart investments in coordination with the RCU and PASET governance bodies. The Permanent Fund Manager will be responsible for setting up a Permanent Fund based on a background study and in consultation with the PASET EC, RCU and World Bank guidelines, including establishing and implementing investment-related policies such as spending policy, investment policy and asset allocation policy; monitoring investment portfolio; and rebalancing the portfolio periodically. The Permanent Fund Manager will also be responsible for managing risks (currency, country, investment, bank), respecting ethical and legal requirements for investments, planning for investment liquidity, transferring proceeds to the General Fund on a regular basis, managing reporting, and ensuring safeguarding of the Fund's assets through detailed records, maintaining asset registers and documenting administrative procedures.
- (d) **RSIF administration units:** The administration units established by the RCU for the three RSIF windows will manage the day-to-day activities of the RSIF windows for PhD training, research and innovation under the RCU's supervision and coordination.

The key responsibilities of each of the entities are outlined below.



Figure 1: Organizational Chart



2. **Regional Coordination Unit:** The core implementing unit for the RSIF project is the RCU that will receive and administer the IDA grant funds and funds from the Government of Korea and will lead the implementation of the project. The RCU will be in charge of the overall coordination, planning, monitoring and evaluation of project activities under the supervision of the World Bank and oversight and monitoring of PASET governance bodies. It will comprise a project coordinator, a financial management specialist, a monitoring and evaluation specialist and a procurement specialist at its core. Some of the key responsibilities of this unit are listed below:

(a) Financial management: This includes:

- i. Receiving the World Bank IDA grant funds, Government of Korea funds and funds from other potential sources and managing them efficiently according to the highest standards of fiduciary management
- ii. Disbursing funds to universities and students ensuring transparency, timeliness, efficiency and fairness.
- iii. Producing regular financial reports and commissioning audits
- iv. Preparing and presenting annual budgets
- v. Preparing funding usage reports on a monthly basis (or as requested)
- vi. Ensuring that all necessary legal requirements in countries of funding and operation are respected
- vii. Ensuring the documentation of all expenses and availability of all original receipts
- viii. Ensuring that all funds can be tracked by donors and that all donor requirements are respected

(b) Project implementation and management: This includes:

- i. Setting up administration units for each of the RSIF windows – a unit for PhD training and



- research and another unit for innovation.
- ii. Managing the selection process for host universities following guidelines approved by the World Bank in consultation with the PASET EC
- iii. Overseeing the selection of students for RSIF awards for PhD scholarships, research and innovation grants by administration units to ensure a fair and efficient process that selects a balanced class of the most highly qualified students
- iv. Identifying partner institutions for RSIF host institutions and finalizing MoUs and agreements
- v. Planning, executing and managing RSIF program marketing strategies
- vi. Reporting progress of RSIF to PASET governance bodies.
- vii. Hiring and managing staff
- viii. Developing programmatic linkages between RSIF and other related programs that are relevant (such as journal publishing or PhD capacity building)

(c) Fund Management. This includes:

- i. Recruiting a Permanent Fund Manager in line with World Bank guidelines and in consultation with PASET EC and provide oversight for his activities. As part of this, the RCU will:
  - 1. Conduct a background study through hiring a consultant to collect necessary information to decide the structure, governance, and policy of the fund
  - 2. Evaluate and select an Investment Fund Manager based on criteria including but not limited to the following:
    - a. Investment philosophy, portfolio construction process and track record of the investment team
    - b. Consistent application of that philosophy and process
    - c. Experience and education of the investment and portfolio management teams
    - d. Turnover of key investment professionals
    - e. Research capabilities and business operations
    - f. Technological capabilities (in-house trading platforms etc.) and resources (including third party providers)
    - g. Experience in non-profit sector; investment performance reports
  - 3. Without in-house investment staff, the RCU is to use outside consultants to select managers and understand clearly the consultant's approach and processes for manager selection
- ii. Managing the General Fund and ensuring funds are properly and efficiently spent in the three RSIF windows.
- iii. Ensuring proper flow of revenue funds from the Permanent Fund to the General Fund
- iv. Undertaking appropriate long-term planning and ensuring the proper movement of funds between accounts

(d) Monitoring and Evaluation. This includes:

- i. Developing an M&E framework to track progress of RSIF activities including key performance indicators for project performance.
- ii. Identifying and measuring suitable indicators to assess impact of the RSIF towards attainment of the PASET goals.
- iii. Operating tracking system for PhD students including their activities, progress and so on
- iv. Developing an alumni management system to support alumni linkages



(e) Business Development and Fundraising. This includes:

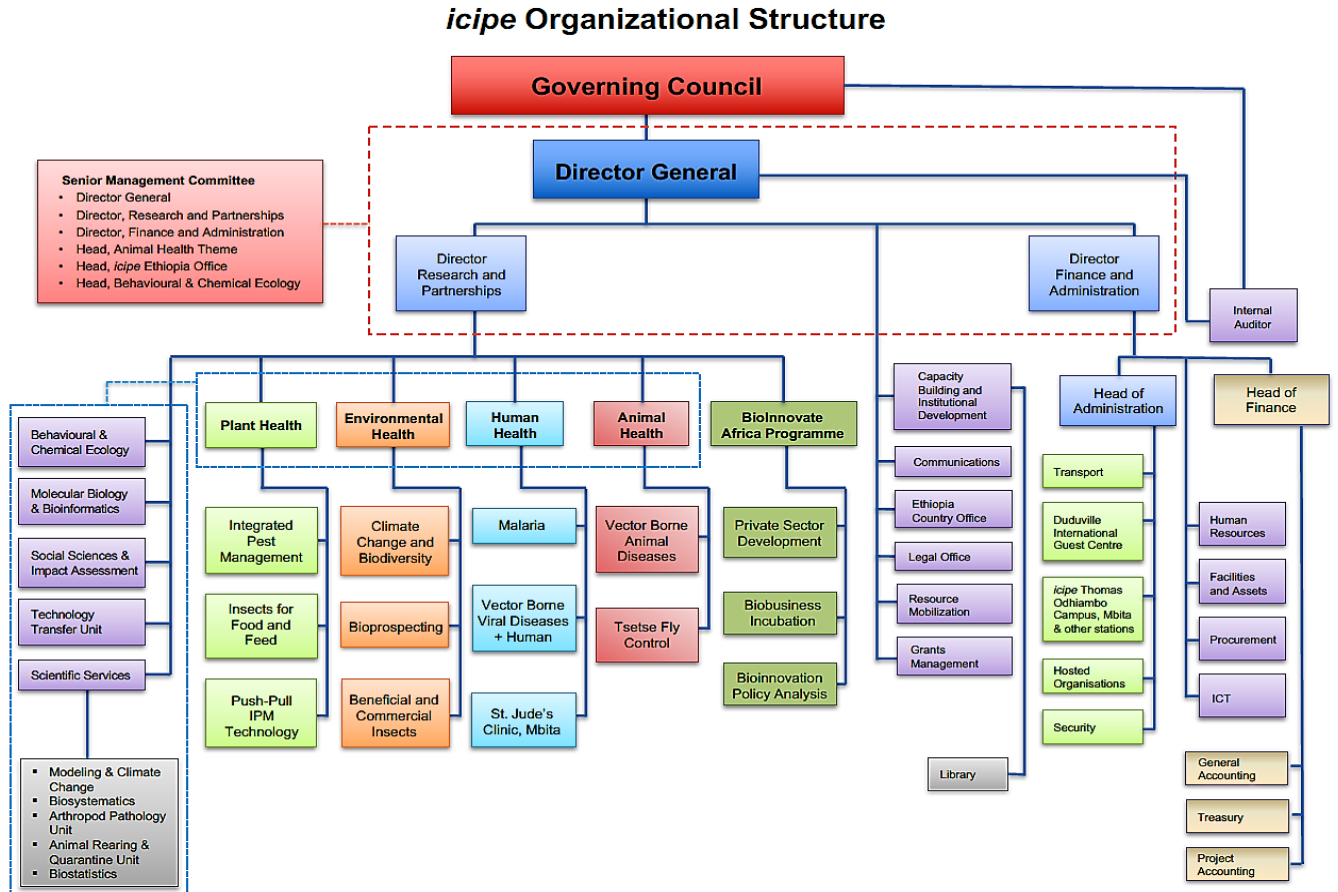
- i. Growing the General and Permanent Funds by identifying potential financial partners and writing grant proposals to secure further funds in collaboration with World Bank and in consultation with PASET governance bodies.
- ii. Securing non-financial contributions from partners
- iii. Linking business development and fundraising to PASET RSIF public relations and positioning activities.
- iv. Developing linkages to national governments and their financial contributions to research and science.

3. The International Centre of Insect Physiology and Ecology (*icipe*) has been selected through a competitive process to host the RCU for RSIF. *icipe* is a non-profit organization that was established in 1970. It is headquartered in Nairobi, Kenya, with country offices in Ethiopia, Uganda and Somalia. Granted a Charter as the basic legal instrument, *icipe* is an international and inter-governmental organization established as an autonomous, nonprofit making, research and capacity building institution. It currently has operations in 38 African countries, and thriving partnerships with universities and research organizations as well as regional and national media outlets across the world. *icipe's* partners in postgraduate training are international, and since 1983 have included 43 universities in 18 African countries and 39 universities from 14 other countries around the globe, and numerous other national and international research institutes and training partners. Alumni and current research fellows represent 37 countries across Africa, reflecting a continent-wide impact of *icipe's* postgraduate programs.

4. *icipe* has well-developed mechanisms for conducting and managing world-class collaborative research, and for translating research outputs and technologies into innovations for societal use. Its work largely revolves around collaborations with universities, public research institutes and private sector firms in Africa. Although it already has extensive experience with managing similar activities, it needs a significant capacity boost to effectively implement RSIF activities and establish it as a capacity builder for research and innovation in ASET for SSA.

5. *icipe* is currently governed by the governing council consisting of the members from Switzerland, Sweden, the United States, Kenya, Liberia, Colombia, Australia, France, Ethiopia and Japan. The BioInnovate Africa Program's Advisory Committee (PAC) would be expanded to form the RSIF steering committee to oversee and guide implementation of the RSIF. With respect to the Permanent Fund, an independent professional Fund Manager shall be recruited to invest and manage the fund. The General fund will be integrated within two units at *icipe*: PhD training window of the RSIF will be implemented through the *icipe's* Capacity Building and Institutional Development (CB&ID) program. This program will also provide the training for PhD researchers. The research and innovation window of the RSIF will be implemented through the BioInnovate Africa Competitive Grants Scheme. The administrative and management resources will be withdrawn from these two units to develop guidelines and operational procedures for the RSIF PhD scholarship, research and innovation windows.

Figure 2: icipe Organizational Structure



6. **PASET Governance Bodies:** The PASET Board of Directors will set the strategic direction and vision of RSIF, the EC will monitor the progress of activities and provide overall guidance for effective project implementation and the PASET CAG will provide guidance to the Board in an advisory capacity. The Board of Directors is currently comprised of Ministers of Education or Higher Education of five African countries that are currently members of PASET (Senegal, Ethiopia, Rwanda, Kenya and Cote d'Ivoire), representative of Korea, and representative of the Bank. Going forward, the Bank will recuse itself from the PASET Board for all RSIF related discussions. Other countries or partners that contribute to the RSIF can become members of the Board. The composition of the Board and the governance structure of PASET will evolve as the partnership evolves. The EC will comprise of senior technical advisors to the Ministers of PASET member countries. The PASET CAG is an advisory body that includes scientists, academics and experts predominantly from Africa but also from private sector and some partner countries like China and Korea. They will provide expert guidance to the Board of Directors and EC on the priorities for the region and technical elements for the RSIF.



7. **Permanent Fund Manager:** The RSIF Permanent Fund Manager, recruited by the RCU, will be responsible for establishing, management and growth of the Permanent Fund under the supervision of the RCU by making profitable and smart investments. The Fund Manager’s responsibilities include but are not limited to the following:

- (a) Establishing a Permanent Fund
  - i. Implement the spending policy based on guidelines from the Board of Directors/Trustees
  - ii. Establish written investment policy statement based on the funding needs
  - iii. Determine asset allocation policy based on the degree of risk permitted in Permanent Fund’s investment portfolio
- (b) Prudently managing investible funds of the endowment for optimal returns
  - i. Design a portfolio to meet RSIF’s investment objectives
  - ii. Select appropriate investments to achieve the target growth rate while balancing this with appropriate risk
  - iii. Monitor investments and periodically conduct portfolio rebalancing
  - iv. Ensure disbursement of proceeds to the general fund hosted under the RCU in a timely manner
  - v. Produce financial statements and management reports to the RCU on a regular basis
  - vi. Ensure safeguarding of the Fund’s assets through detailed records, maintaining asset registers and documenting administrative procedures
  - vii. Support the RCU and PASET governance bodies in fundraising activities and contacting potential investors when required.

8. **RSIF Administration Units:** Administration units will manage the activities of the RSIF windows for PhD training, research and innovation. Depending on the nature of the administration unit set up, it may be comprised of an administrator, a financial management officer, a procurement officer, and a monitoring and evaluation officer.

(a) Scholarship and research administration unit. This includes:

For scholarships:

- i. Managing the day-to-day administration of the RSIF PhD scholarship program under the supervision of the RCU
- ii. Planning and executing the annual work plans for the scholarship program
- iii. Launching the call for RSIF scholars for each cohort
- iv. Responding to applicant questions and updating information to make processes clearer to applicants
- v. Coordinating the selection of RSIF scholars with fairness and efficiency
- vi. Tracking the progress of scholars throughout their studies and ensuring scholars adhere to the terms and conditions of their scholarship.
- vii. Reporting to the RCU with regular updates on the PhD training program.

For research grants:

- viii. Managing the day-to-day administration of the research grants program
- ix. Planning and executing the annual work plans for the research grants program
- x. Launching calls for proposals for research grants
- xi. Coordinating the selection of grantees with fairness and efficiency
- xii. Monitoring the grant disbursements and usage





- xiii. Reporting to the RCU with regular updates on the progress of research and direction of research projects

(b) Innovation administration unit: This includes:

- i. Managing the administration of the innovation grants program
- ii. Coordinating the selection of grantees for the innovation grants with fairness and efficiency
- iii. Monitoring the grant disbursements and usage and tracking the progress of grantees.
- iv. Organizing workshops for RSIF host universities on the development of entrepreneurship and innovation programs including the application of transformational technologies
- v. Developing networks of incubators and tech hubs as well as university-based incubators in SSA especially those geographically and content-wise aligned to RSIF host universities and facilitating the connection with the host universities
- vi. Organizing inter-grantee networks for peer support and inter-grantee learning towards building communities of grantees
- vii. Developing capacity of RSIF host universities through linking them with existing incubators, capacity development programs hosted by the World Bank or other organizers
- viii. Developing networks with industry and facilitating partnerships with universities

9. **Operational Manual:** An operational manual for the project has been prepared by the RCU. The operational manual will guide implementation of project activities.

### Financial Management

10. As part of preparation, the Bank conducted a financial management assessment of the International Centre of Insect Physiology and Ecology (*icipe*), which has been selected as the Regional Coordination Unit (RCU) for RSIF. *icipe* will be the primary implementation body tasked with the overall coordination, planning, monitoring and evaluation of project activities, including financial management. The objective of the financial management assessment was to determine whether the implementing entity's financial arrangements: (i) are capable of correctly and completely recording all transactions and balances relating to the project; (ii) facilitate the preparation of regular, accurate, reliable and timely financial statements; (iii) safeguard the project's assets; and (iv) are subject to auditing arrangements acceptable to the Bank<sup>28</sup>.

11. As mentioned in the Project cost and financing section, activities under component 1 will be financed by an IDA Grant, while Component 2 will be financed by the Korean funding (administered by the WB). The FM capacity assessment has reviewed the arrangements needed for the Project as a whole, understanding that IDA Grant and Korean funding are subject to Bank policies and procedures. As it relates to the Permanent Fund though, while Sub-component 1.1 will finance activities needed to establish it, the fund itself will not be financed out of the IDA grant or Korean funding proceeds. Consequently, this assessment is not addressing common operational requirements (e.g. funds flow, reporting and auditing) discussed when Bank proceeds are used to fund similar endowment funds.

12. With the scope defined above, the assessment focused on planning and budgeting, accounting, internal control systems including internal audit, financial reporting both in-year and annual, banking arrangements, disbursements and funds flow, and external auditing.

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<sup>28</sup> The assessment complied with the Financial Management Manual for World Bank-Financed Investment Operations that became effective on March 1, 2010 (last updated on February 10, 2017)



13. Based on the information available as of the date of this document, the fiduciary risk is assessed as Substantial. From the FM perspective, key risk factors are related to: i) project complexity especially in relation to Component 2, which involves the financing of scholarships and research grants that requires the disbursement of funds to host universities/scholars for them to carry out certain activities and document expenditures. ii) Implementation of those activities would require *icipe* to have in place strengthened capacity and well-developed procedures for the administration of the three windows, including the tools and procedures to record, control, monitor and report on those activities. Such capacity may not be fully in place at this stage and will only be created as activities under Component 1 advance. (iii) The use of -at least- three sources of financing will pose some challenges to keep orderly segregated accounting records that allow the preparation of reliable financial reports. Finally, (iv) while *icipe* has qualified staff, sound financial management systems, and wide experience with other donors; their lack of familiarity with WB policies and requirements, will require substantive support and monitoring.

14. Mitigating measures have been discussed with *icipe*, and these include: i) designation of specific FM staff that would be trained on WB requirements; ii) the upcoming installation of an ERP system that would integrate some FM functions and would facilitate preparation of financial reports; iii) strengthening *icipe's* policy and procedures for the management of the three windows (supported through Component 1); and iv) a strengthened audit approach.

15. Upon the successful implementation of the mitigating measures mentioned above, together with Bank's implementation support, proposed financial management arrangements can be considered acceptable to the Bank.

### **Detailed Financial Management Arrangements**

16. **Planning and Budgeting.** Project budgeting will follow *icipe* budgeting procedures. Budget instructions are prepared and circulated by the Director, Finance and Administration for use by all departmental heads. The annual operational budget, for the activities for the period between 1 January and 31 December, is then prepared and presented by the Director, Finance and Administration to the Governing Council for approval based on the estimated costs. The annual operational budget is approved by the Governing Council not later than three months into its implementation period.

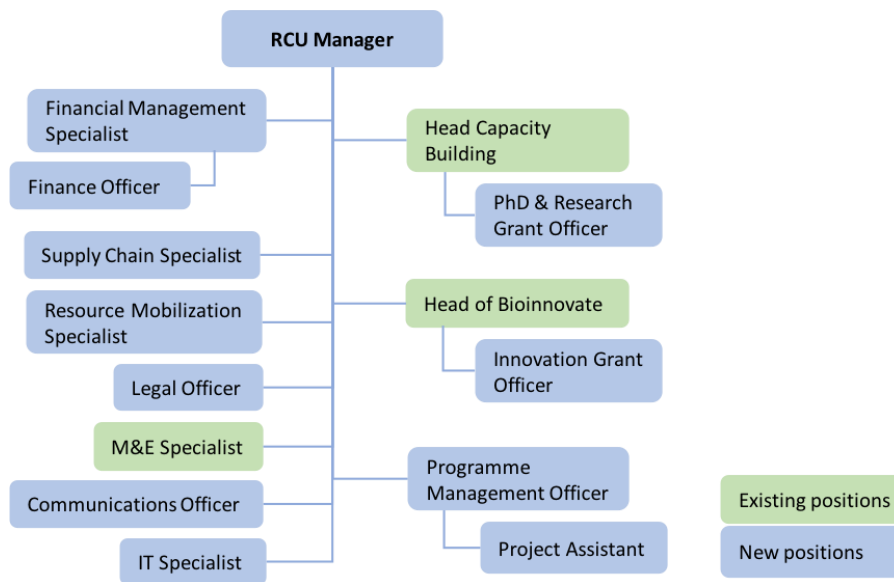
17. *icipe* has sound controls not to exceed approved budget and clearly established mechanisms for the approval of budget variations and reallocations when needed. The Governing Council approves budget variations that will have the overall impact of increasing the overall annual budgets, and the Director, Finance and Administration in case of re-allocation of funds from one expenditure line to another within the same program/project/unit, provided that the funds available for the particular program/project/unit are not exceeded and any external financiers' terms and conditions are complied with. There are also specific regulations for urgent expenditures. The accounting system is able to generate budget versus actual variance reports which are reviewed and comments included for significant budget variations. Those reports are generated on a monthly and quarterly basis and a consolidated one for the annual operational results.

18. **Accounting System.** *icipe* uses SunSystem to handle financial operations, REMIS for HR matters, Enabler for payroll and e-procure for procurement and payment workflows. The accounting system is able to segregate transactions, a ledger and financial reports for each restricted income funding/ project. *icipe* has

daily onsite and offsite backups of all data from the systems. The institution has contracted a vendor for development and installation of an enterprise resource planning (ERP) called Microsoft Dynamic Navision which is expected to commence in July 2018. The system is expected to integrate all financial and operations processes. It will have capability to produce reports by project, by expenditure category, by unit, by end user and against the budget as may be mapped. It will therefore be able to extract financial reports per project expenditure categories and per component.

19. *icipe* will need to ensure that the approved budget for every year is mapped in the accounting system by expenditure category and by component to ensure that financial reports and budget versus actual analysis by expenditure and components is generated from the accounting system.

20. **Staffing.** *icipe* will set up the RSIF RCU comprising of staff dedicated to the project and obtaining support from other departments within *icipe* for activities that do not require fulltime staff under the project. The proposed structure of the RCU is given below:



21. The strengthening of existing units will entail staff re-deployment or re-allocations of duties and trainings to ensure that project activities are delivered effectively. The finance staff of *icipe* have adequate qualifications and experience for their work. They have however not directly implemented a World Bank project. The Finance Officers who will be assigned to handle the project would therefore require to be trained on World Bank financial management requirements.

22. **Internal Controls.** Overall, *icipe* has well documented processes and procedures, which provide for segregations of duties, clear roles and responsibilities and specific controls. *icipe* has various financial and operational manuals that guide its day to day operations. These are: financial policies and procedure manual, procurement policy manual, human resources manual, travel policy manual, investment policy, assets management policy manual, business continuity policy manual, policy on employee whistle blowing, policy on



anti-fraud and anti-corruption, policy on conflict of interest, policies on partner sub-grants, financial assessment for partners, grants management policy and procedures and risk management policy. The FM manual is assessed as adequate for the Project. However, the Grants management policy and procedures will need to be enhanced as specific arrangements for the operation of the three windows are designed. The permanent fund operations will require a separate manual that will be developed as part of the activities financed under Component 1.

23. *icipe* follows an orderly process for the approval, authorization and processing of payments, which includes the recording and dating of all incoming invoices, preparation and review of supporting documentation, and treasury procedures for the preparation, issuance and delivery of checks to payees or their representatives. Similarly, *icipe* follows adequate controls in terms of the opening, management, and closure of bank accounts, including designation of authorized signatures and preparation and approval of monthly bank reconciliations. Procedures for the recording, control and semi-annual verification of assets are also in place.

24. Procedures for imprests and advances were also reviewed as part of the assessments and noted that all cash advanced are required to be accounted for within fourteen working days following the completion of the activity for which it was taken. No employee may hold more than one accountable advance at any one time. Research/out stations shall be funded through an imprest system accounted for once every month and at each replenishment.

25. **Internal Audit and Governing Council.** There is an internal audit department currently comprised of one staff. The internal auditor is a qualified professional who reports to the Audit & Finance Committee of the Governing Council. The Governing Council meets twice a year, where the internal audit issues are discussed and mitigation measures provided. The consolidated reports to the Governing Council comprises of a summary of the internal audit reports, detailed internal audit findings, audit plans for the next six months, update on risk register, whistle blower report and status of previous audit matters. There is evidence of implementation of internal audit recommendations.

26. **Financial Reporting Arrangements.** *icipe* RCU will prepare and submit semi-annual IFRs and annual project financial statements to the World Bank. The semi-annual IFR will be submitted to the World Bank within 45 days after the end of the half year period to which it is related. The format of the IFR has been agreed with *icipe* ICIPE RCU. The financial reports will include IDA proceeds, Korean funding and other contributions, as applicable, for the project.

27. **External Audit.** *icipe* is currently audited by KPMG, a private audit firm. For the last five years reviewed, it has received unqualified audit opinions. KPMG has been the external auditor for the institution for the last four years. As per the organization policies, the external auditor is rotated every five years. There is evidence of implementation of external auditor's recommendations.

28. The World Bank will require project specific audits to be done for the project. The terms of reference for the Auditor will be agreed upon with the Bank. Single sourcing of the institutional auditor to carry out audit of the Bank project will have to be cleared by the Bank's procurement unit. *icipe* will keep the books of accounts and prepare the accounts for audit.



29. **Financial Management Action Plan.** The following actions need to be taken in order to enhance the financial management arrangements for the Project

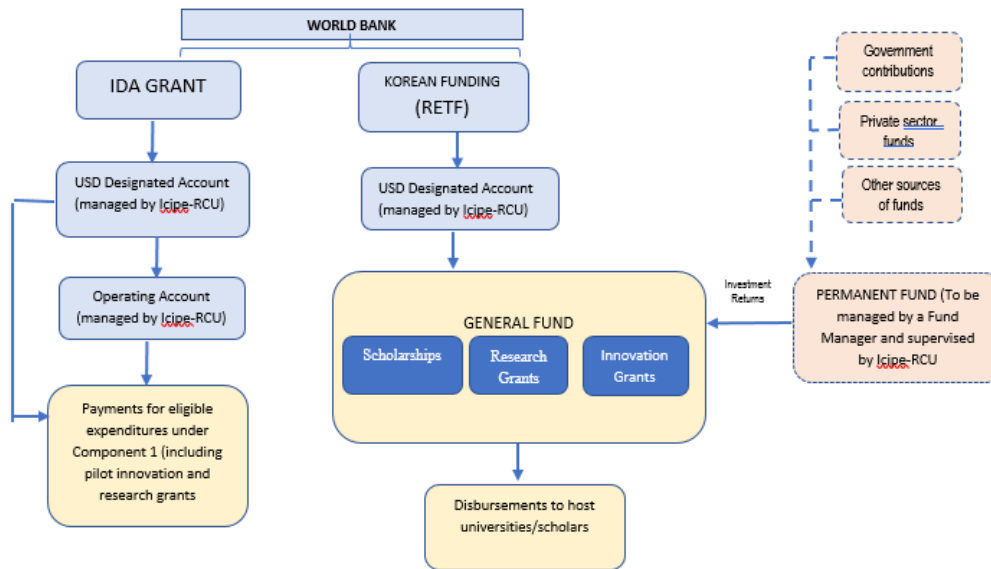
	<b>Action</b>	<b>Implementation by</b>	<b>Implemented by</b>
1	Finance officers designated to the project to be trained on WB financial management and reporting requirements	Implementation	<i>icipe/ WB</i>
2	Confirm the use of two separated Designated Accounts for the IDA Grant and Korean funding.	ICIPE/WB (FM-WFA)	
3	Ensure that the designated dollar accounts and operational accounts is opened for the project. There should be at least two bank signatories as would be approved by the Director General in accordance with ICIPE procedures.	At least within one month of effectiveness	<i>icipe</i>
4	Ensure that an external auditor is appointed for the project as per the WB ToRs that will be shared. Single sourcing of the institutional auditor to carry out audit of the Bank project will have to be cleared by Bank’s procurement unit.	Six months after effectiveness	<i>icipe</i>
5	Enhance/complement the Grants management policy and procedures as specific arrangements for the operation of the three windows are defined	To be confirmed based on the schedule defined for the related activities under Component 1.	
6	Complete the additional analysis for the establishment and operationalization of the Permanent Fund, and the recruitment of Fund Manager	To be confirmed based on the scheduled provided for related activities under Component 1.	<i>icipe / WB</i>

**Disbursements**

30. The chart below shows how funds will flow. As mentioned before, the total project cost will be funded through two sources -IDA and Korea. From the WB, *icipe* will receive: i) IDA funds<sup>29</sup> and ii) Korean TF funds.<sup>30</sup> On a preliminary basis, and taking into account that each of these sources will be financing distinct components, the proposal is to have separate Designated Accounts.

<sup>29</sup> To finance component 1 (Goods, Consultancy, Training, Technical Assistance)

<sup>30</sup> This will finance the scholarships and research grants.



31. IDA Grant proceeds and Government of Korea TF proceeds will be disbursed into two segregated US dollar Designated Accounts – one for each source of financing, as shown above – managed by *icipe* in a financial institution acceptable to the Bank. Signatories to the US\$ bank account will be in line with the Centre’s mandate as approved by the Governing Council.

32. Advances to the DAs will be made in accordance with the instructions detailed in the DFIL. Under the advance method, *icipe* will use Statement of Expenditure (SOEs)-based disbursement approach to disburse funds. The initial disbursement will be based on a periodic (e.g. six month) work plan. Subsequently, the replenishment will be done to the Designated Account upon submitting withdrawal applications for eligible expenditures for the period. The SOE can be submitted monthly.

33. Flow of funds under Research and Innovation Grants. Funds for research and innovation grants will be sent to the host universities and treated as advances to the institutions. This accounting to *icipe* is done using quarterly financial reports and certified copies of invoices and payment vouchers, after which the expenditure is recognized. Tuition payment shall be made directly to the universities while scholar’s stipends shall be paid to the scholar by semester based on the subdivisions of the academic calendar of the RSIF host universities.

34. **Counterpart funding.** Once the Permanent Fund is established, as a result of Component 1, it is expected that additional contributions will be made from different sources. Counterpart funds from other beneficiaries countries are expected to be transferred to *icipe* using either of the following ways:

- Direct contributions to *icipe* from government’s own resources
- Contribution to *icipe* through regional IDA credit or national IDA credit
- Contribution to *icipe* through regional IDA projects



## Procurement

35. **Procurement for the proposed project will be carried out in accordance with the ‘World Bank Procurement Regulations for Borrowers under Investment Project Financing’, dated July 1, 2016 and Revised in November 2017**, hereafter referred to as ‘Procurement Regulations’. A short form of Project Procurement Strategy for Development (PPSD) has been prepared by the RCU, *icipe*. The PPSD describes the overall project operational context, market situations, implementing agencies capacity and possible procurement risks. The Procurement Plan sets out the procurement selection method, as well as prior and post review thresholds to be followed by the Borrower during project implementation in the procurement of Goods, Works, and Non-consulting and Consulting services. No Works are envisaged under this Project.

36. Procurement shall be carried out by the RCU to be established at International Centre of Insect Physiology and Ecology (*icipe*). Procurement at *icipe* is guided by the internally developed Procurement Policy and a well-established Enterprise Recourse System (ERP). It is familiar with framing specifications and contract management with the help of its legal department and is familiar with procurement of goods, works, non-consultancy services and services. *icipe* has implemented several donor-funded projects, however, it does not have prior experience in implementation of World Bank funded projects. The staff may require initial training on the New Procurement Framework of the World Bank and initial support for selection and employment of a few consultancies. The RCU is expected to establish systems and mechanisms for addressing and escalating their grievances and complaints.

37. The project operation manual will define all aspects of procurement procedures. This manual will be subject to World Bank approval. The procurement strategy defined in the manual will consider among other aspects, the market situation, operational context, past experiences and risks.

38. The project procurement profile mainly comprises a few complex consultancies for establishment of an ICT platform, the conduct of essential studies, establishment and management of office infrastructure and various individual consultants. An initial Procurement Plan has been developed and agreed during negotiations covering the activities of the first 18 months of project implementation. It will be uploaded to the Systematic Tracking of Exchanges in Procurement (STEP) and disclosed on the Bank’s external website.

39. Following are procurement arrangements applicable for the Project:

- i ) Procurement under the Project will be carried out in accordance with World Bank Procurement regulations for IPF Borrowers July, 2016 and revised in Nov 2017.
- ii ) Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, dated October 15, 2006 and revised in January, 2011 and as of July 1, 2016, and other provisions stipulated in the Financing Agreements.
- iii ) Systematic Tracking of Exchanges in Procurement (STEP): The project will use STEP, a planning and tracking system, which will provide data on procurement activities, establish benchmarks, monitor delays, and measure procurement performance. The first 18-months Procurement Plan (PP) shall be reviewed and cleared by the Bank thru STEP. This PP shall be updated at least annually. All procurement to be carried out under the project shall be included in the PP and prior cleared by the Bank.
- iv ) The SBDs for Goods and works for National and International Bidding and SRFP for Consultancy shall be used.





- v ) **Operating Costs:** Operating costs are defined in the Appendix to the Legal Agreement pertaining to this project and may include, among others: costs of operation, rent and maintenance of offices, communication costs, incremental staff salaries (including government staff on deputation to the Project), training, and travel allowances of project beneficiaries and project staff related to project implementation, coordination, and monitoring but excluding the salaries of the Borrower. The day to day operational costs related to vehicle hiring, printing, among others, would also be supported. These items are to be procured using the Borrower’s (Icipe) procurement and administrative procedures acceptable to the World Bank.
- vi ) **Record keeping.** All records pertaining to award of tenders, including bid notification, register pertaining to sale and receipt of bids, bid opening minutes, bid evaluation reports and all correspondence pertaining to bid evaluation, communication sent to/with the World Bank in the process, bid securities, and approval of invitation/evaluation of bids will be retained by respective agencies and uploaded in STEP.
- vii ) **Disclosure of procurement information.** The following documents shall be disclosed on the project website: (a) a Procurement Plan and updates; (b) an invitation for bids for goods and works for all contracts; (c) Request for Expression of Interest for selection/hiring of consulting services; and (d) contract awards of goods, works, and non-consulting and consulting services
- viii ) **Complaints Handling.** For procurement-related complaints, the project will follow the procedure prescribed in the Procurement Regulations (Para 3.26 and 3.31). In order to deal with complaints from bidders, contractors, suppliers, consultants and the general public at large, a complaint handling mechanism will be set up for which the detailed procedure is prescribed in the Operations Manual.
- ix ) **Fiduciary oversight and Procurement Review by the World Bank.** The World Bank shall prior review contracts according to prior review thresholds set in the Procurement Plan. All contracts not covered under prior review by the World Bank shall be subject to post review during implementation support missions and/or special post review missions, including missions by consultants hired by the World Bank. The RCU shall be responsible for providing the consolidated list of contracts for carrying out the annual procurement post review. For contracts at the RCU level, procurement post review shall be carried out by the Bank’s Procurement Specialist or a Bank-appointed consultant.
- x ) **Contract management capability.** The major consultancy contracts are awarded by the RCU. The RCU being the nodal agency remains overall responsible for the compliance to the agreed procurement procedures and processes, and shall monitor the contractual performance including contract management issues, if any.
- xi ) **Project Procurement Strategy for Development (PPSD).** The PPSD for project has been prepared by RCU during the project preparation and is summarized in the box below.

**Box 1: Summary of the Project Procurement Strategy for Development (PPSD)**

Summary of PPSD
The Project Development Objective is to strengthen the institutional capacity for quality and sustainable doctoral training, research and innovation in transformative technologies in sub-Saharan Africa.
Based on the project requirements, technical solutions and market base, procurement





strategy has been developed to go for open international competition for complex procurements. The selection of various consultancy services will be the critical procurement activities for the project. Based on the broad market assessment, there are potential service providers in the international market for providing services required for the project. The project related requirements for Goods (both the domestic and imported), Services, Non-consultancy services can be procured from the domestic market. No major Works envisaged under the Project.

The Borrower has limited experience in implementation of project procurement transactions of similar magnitude and complexity. To strengthen the procurement capacity at *icipe*, providing procurement training for identified Supply Chain specialist cum Procurement Specialist(s) to make them familiar with the NPF regime of World Bank. Also, to manage complex consultancy procurement processes, provide hand holding may enable the project to progress as envisaged.

To monitor the progress at multiple level and multitude of stakeholders in SSA region, ensure smooth coordination between different agencies and resolve issues that may arise during implementation, a multi-tiered institutional monitoring mechanism will be set-up using the ICT platform.

Risk Description	Description of Mitigation	Risk Owner
The RCU not having prior implementation experience in the World Bank funded projects in particular through NPF	<ul style="list-style-type: none"> <li>- Train the existing procurement personnel;</li> <li>- Provide handholding for complex consultancies</li> </ul>	RCU / World Bank
The RCU’s procurement system may be different on few aspects from the Bank’s Procurement System	<ul style="list-style-type: none"> <li>- Adherence to the Procurement Regulations (applicable Version)</li> <li>- Procurement Plan through STEP</li> <li>- Use of Standard Bidding / Proposal document prescribed by the Bank</li> <li>- Country conditions for National Competitive Bidding;</li> <li>- Disclose the award of contracts through the official website to enhance the transparency</li> </ul>	RCU
International service provider may not participate in the potential business opportunities through the project	<ul style="list-style-type: none"> <li>- Early engagement of potential provider and providing adequate time for submitting their expression of interests and proposals</li> </ul>	RCU
Lack of effective	<ul style="list-style-type: none"> <li>- Various committees have been</li> </ul>	RCU



coordination at various level of implementation	constituted to ensure effective coordination and involvement	
The consultant firms may not deploy all the staff as per the proposal	- Negotiate before initiating the contract and monitor with the help of technological tools.	RCU

In view of the regional scope of the project, the multiple levels of implementation, the multitude of stake holders, the staff with procurement proficiency at RCU, the weak procurement capacity at host institutions<sup>31</sup>, and the RCU’s limited prior experience in procuring and managing Bank procurement through the New Procurement Framework mainly consultant selection, the procurement mitigated risk is rated as **Substantial**.

**Environmental and Social (including safeguards)**

40. No adverse or only minimal environmental and social impacts are anticipated under the proposed Project, given the small size of the civil works to be financed by grants to participating universities, which will only apply to existing buildings. No new structures or works of significant size are envisaged under the Project, and therefore the environmental or resettlement (including restriction of access to resources) risks are expected to be negligible. No safeguards policies are being triggered, and the environmental category for the proposed project is C, with no Environmental and Social Management Plan (ESMP) necessary to be prepared. On a precautionary basis, the Operational Manual for participating universities will include a reference to WBG General Environment, Health and Safety Guidelines to promote best practices for activities such as classroom renovations or equipment replacement. During the project implementation, the Regional Coordination Unit will carry out periodic monitoring and evaluation of any (if applicable) environmental and social aspects of the project activities.

**Monitoring and Evaluation**

41. **Project monitoring indicators:** The RCU will monitor and report to the Bank progress on the PDO-level results indicators, and relevant core sector indicators. These indicators are listed in the Results Framework and Monitoring table. The RCU will also monitor and report on beneficiary numbers, and a number of other indicators specific to project activities.

42. **Monitoring project implementation:** The selected RCU will have a monitoring and evaluation officer and collect project implementation data. For the scholarship related data, RSIF host universities will report on the progress using the existing RSIF reporting IT system. For monitoring related to implementation arrangements, financial management and procurement activities and functions, and environmental and social safeguards and activities, including project covenants, the Bank will rely on reporting and evidentiary data and documentation submitted by regional coordination unit.

<sup>31</sup> If any Procurement by the Host universities, the Bank will review their procurement capacity for select host universities.

**ANNEX 3: IMPLEMENTATION SUPPORT PLAN**

**COUNTRY : Africa**

**Africa Regional Scholarship and Innovation Fund for Applied Sciences, Engineering and Technology**

**Strategy and Approach for Implementation Support**

1. The strategy for implementation support has been developed based on the nature of the project, its innovative design and risk profile. The objective of the implementation support is to provide the client with flexible and efficient guidance and mitigation of risks. The approach strongly emphasizes open and regular communication with all actors involved in the project (such as the RCU, administration sub-units, selected host institutions, PASET bodies etc.), frequent information exchange, and adequate flexibility to accommodate the specificities of each of the participating countries. Strong communication channels and links will be established with all the actors but especially the RCU which is the core implementing unit for this project.
2. Implementation support will be comprised of: (a) review missions; (b) regular technical meetings and field visits by the Bank between the review missions; and (c) internal audit and FM reporting.

**Implementation Support Plan and Resource Requirements**

Time	Focus	Skills Needed	Resource Estimate	Partner Role
First twelve months	Technical Review and Support	Technical knowledge and experience in higher education, planning and capacity building	Higher Education/Education Specialist: 10 SWs	Korean officials may join some missions.
	Institutional arrangements and project supervision coordination	Task/project/team management, operations, planning and coordination	Operations or Implementation officer: 16 SWs	
	FM Training and Supervision	Technical knowledge and experience in FM	FM specialist: 8 SWs	
	Technical Review and Support	Technical knowledge and experience in higher education, planning and capacity building	Higher Education/Education Specialist: 10 SWs	
	Institutional arrangements and project supervision coordination	Task/project/team management, operations, planning and coordination	Operations or Implementation officer: 16 SWs	
12-48 months	M&E arrangements review	Technical knowledge and experience in M&E	M&E Specialist: 4SWs	N/A

	Environmental and Social monitoring and reporting	Technical knowledge and experience in environmental and social safeguards	Environmental safeguards: 2 SWs annually Social Safeguards: 2 SWs annually
	FM monitoring and reporting	Technical knowledge and experience in FM	FM specialist: 8 SWs
	Procurement management	Technical knowledge and experience in procurement	Procurement specialist: 2 SWs

**Note:** FM = Financial Management; M&E = Monitoring and Evaluation; SW = Staff Weeks

Skills Mix Required			
Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Operations/Implementation	16 SWs annually	Field trips as required	HQ based
Higher Education/Education specialist	10 SWs annually	Field trips as required	HQ based
M&E specialist	4 SWs annually	Field trips as required	Country office based
FM specialist	8 SWs annually	Field trips as required	Country office based
Procurement specialist	2 SWs annually	Field trips as required	Country office based
Social safeguards	1 SWs annually	Field trips as required	Country office based
Environmental safeguards	1 SWs annually	Field trips as required	Country office based
Senior Legal counsel	2 SWs annually	-	HQ based

**Note:** HQ = Headquarters; FM = Financial Management; M&E = Monitoring and Evaluation; SW = Staff

Partners

Name	Institution/Country	Role
Republic of Korea	Republic of Korea	Financier/ Technical partner



## ANNEX 4: ECONOMIC ANALYSIS

COUNTRY : Africa

Africa Regional Scholarship and Innovation Fund for Applied Sciences, Engineering and Technology

1. **This project is structured in two main components: (1) developing the capacity for the operation and management of the Scholarship, Research and Innovation Fund, and (2) providing scholarships for PhD training and research grants in ASET fields.** The first and major component aims at strengthening the institutional capacity of a Regional Coordination Unit, selected to become a science, technology and innovation capacity building hub for Sub-Saharan Africa. Because it consists of technical assistance to build the capacity for enhancing the research and innovation environment in several SSA countries, the direct benefits of this component cannot be completely captured by a cost benefit analysis. Therefore, its significance is justified by assessing the benefits of investing in the capacity building of a regional coordination unit, building up on the evidence available related to the impact of developing cluster initiatives. Furthermore, the benefits from the capacity building component are also associated with the positive impacts generated by the development of the activities linked to the RCU strengthening: the PhD scholarships, research and innovation grants.

2. **Component 2 has two subcomponents: (1) the provision of scholarships for doctoral training in ASET fields, and (2) the financing of research grants for projects in ASET fields related to transformative technologies aligned with the needs of the priority sectors.** As the direct benefits of subcomponent 2.2 cannot be completely measured, the economic and financial analysis will focus on subcomponent 2.1, related to the scholarships. Furthermore, under this component, the scholarship window is the major investment allocation, representing 80 percent of the total financed.

3. **The economic and financial analysis addresses four key questions: (1) what are the benefits of developing the capacity of the RCU; (2) why it is so important to invest in doctoral training and post-doctoral research and innovation across SSA; (3) the rationale behind investing in a regional initiative; and (4) what are the major expected benefits and costs related to the scholarship program.** Subcomponent 2.1 focuses on the increase in the availability of highly qualified individuals, with a focus on ASET fields. Beneficiaries are expected to: improve the skills level of the future generations of students, who will have access to better qualified teachers and mentors; improve the quality of the research produced and oriented towards regional needs; and support the development of the private sector, where companies are able find the required skills they need in the local labor force.

### Expected Benefits of Component 1

4. **At the regional level, the choice of a coordination unit is justified by efficiency gains, lower administrative costs, leverage capacity and leadership in terms of programmatic focus.** As a regional initiative, there is a need for a centralized unit, to coordinate all the activities related to the Fund. The selected RCU will be able to expand its services and efficiency gains arise as the unit becomes responsible for the operation and management of the scholarships, research and innovation grants, reducing administrative layers and costs.



5. **The expected impacts of the Fund are higher in the presence of a regional leadership unit, that will serve as a cluster to foster the knowledge flow among institutions, improve the quality of the training provided, leverage resources, while being accountable for results.** One of the advantages of the regional initiative is that it supports institutions with established quality PhD programs in the priority areas to train a pool of talented human capital in fields related to these technologies who will contribute to bringing more investment to and creating jobs in the region to achieve economic growth and reinforcing their ties towards common regional development goals. The leverage capacity can be higher at the regional level, where the RCU can build stronger networks of partners at the national, regional and global level compared to individual institutions. According to Muro and Katz (2010)<sup>32</sup>, cluster thinking can help to draw the attention to the real-economy dynamics, considering the need for local discretion across regions and industries. At the same time, it maintains the policy focus, and represent an important instrument for coordinating fragmented policy towards improved efficiency.

6. **At the local level, providing technical capacity building to the host institutions is expected to generate positive impacts at the program level and beyond. Benefits are expected to be perceived at the level of the PhD programs selected and throughout the economy.** The RCU will provide support to the design of the PhD training at the host institutions, including curriculum development, as well as facilitate mentoring programs and networking initiatives. It is expected that these efforts will lead to improvements in the quality of the programs offered and to the productivity of their graduates and researchers. As discussed by Porter (1998)<sup>33</sup>, modern competition depends on productivity. The selected ASET training programs will serve as clusters in their field and benefit the local economy by generating better qualified and more productive graduates. The local economy benefits as companies will have access to a more productive pool of employees. This can stimulate new businesses, but also it signals better opportunities for talented workers from other locations, which can promote the expansion and strengthening of the cluster itself.

7. **Economies traditionally benefit from the qualified work force trained in the surrounding universities. Their activities are correlated and one of the indirect impacts of this project is to strengthen this connection and stimulate economic growth.** Hausman (2012)<sup>34</sup> analyzed the impacts of an external shock that provided US universities with property rights to innovations developed under federal funding. Two main impacts were observed: long-term employment and payroll per worker around universities rose rapidly in industries more closely related to local universities innovative strengths, and areas surrounding universities that historically received more federal research funding grew faster than the others after the new law. The benefits of Component 1 of this project derive from the choice of a RCU as the best alternative to implement the Scholarships, Research and Innovation Fund and its related activities. These include the strengthening of the host institutions, through the support provided and the promotion of knowledge flows among them, with expected positive impacts in the local economy and growth.

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<sup>32</sup> Muro, M. and B. Katz. (2010). The New “Cluster Moment”: How Regional Innovation Clusters Can Foster the Next Economy. Metropolitan Policy Program. Washington, DC: Brookings Institution.

<sup>33</sup> Porter, M. E. (1998). Clusters and the New Economics of Competition. Harvard Business Review. Nov-Dec, 76(6):77-90.

<sup>34</sup> Hausman, N. (2012). University, Innovation, Local Economic Growth, and Entrepreneurship. US Census Bureau Center for Economic Studies Paper No. CES-WP- 12-10.



**Expected Benefits of Subcomponent 2.1**

8. **Investments in education increase human capital and productivity, leading to higher economic growth. At the individual level, workers become more productive, employable and earn higher salaries.** Moreover, additional years of schooling can lead to increased payment in taxes, as individuals earn more, and the decrease in the likelihood of receiving government social assistance. At the social level, investments in education are related to the reduction in crime and risky behaviors, as well as increased political participation. For instance, Majgaard and Mingat (2012) present a simulation of social outcomes as a function of the highest grade attained. For SSA, they show that having upper secondary level completed compared to no formal education generates an increase in the use of any contraceptive method from 28 to 55 percent, a 50 percent decrease in the under-5 mortality rate, and the poverty risk is reduced by more than two thirds.<sup>35</sup>

9. **Despite the increase in the demand for secondary education given the latest achievements in primary enrollment and completion, enrollment rates in higher education are low.** Though enrollment in tertiary education has doubled in the last ten years, from 4.4 million students in 2005 to 8 million in 2015, this expansion is not enough to meet the growth in the demand for skilled labor. Furthermore, enrollment in tertiary education is the lowest compared to other regions.

10. **SSA countries need to produce more graduates in ASET fields, as there are skills shortages in sectors essential to their development, such as sciences, health, agriculture, engineering, and technology.** Countries in SSA region have the challenge to expand higher education with quality, generating the institutional and human resources capacity to participate in the global economy - where new labor market skills are required and technology advances fast. Still, enrollment in ASET fields account for around half of the enrollment in social sciences and education.<sup>36</sup> These sectors are important for SSA countries' economic growth and in need of high-skilled labor. For instance, the demand for applied science solutions related to water and sanitation, transportation and telecommunications are expected to grow as half of the population in Africa is projected to be urban by 2030.<sup>37</sup> Also, this has negative impacts in the teaching quality within these areas at lower levels of education.

**Table A.1: GER in Tertiary**

	2005	2015
Arab States	22.12	31.18
Central and Eastern Europe	58.66	77.51
Central Asia	27.04	25.96
East Asia and the Pacific	23.29	40.25
Latin America and the Caribbean	30.73	46.51
North America and Western Europe	69.94	76.37
South and West Asia	10.29	24.90

<sup>35</sup> Majgaard, K. and A. Mingat. 2012. *Education in Sub-Saharan Africa: A Comparative Analysis*. Washington, D.C.: World Bank.

<sup>36</sup> World Bank. 2018. *The Skills Balancing Act in Sub-Saharan Africa: Investing in Skills for Productivity, Inclusion and Adaptability*. Washington, DC: World Bank.

<sup>37</sup> World Bank. 2014. *Applying science, engineering and technology for African competitiveness and development (English)*. Science, technology, and skills for Africa's development. Washington DC: World Bank.





Sub-Saharan Africa	5.85	8.50
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Source: UNESCO-UIS database.

11. **There is a need for increasing the percentage of staff with doctoral level degrees in higher education institutions in Africa.** Reasons behind these numbers include low salaries, lack of equipment and funding, and limited autonomy. The RSIF project will contribute by upgrading the qualification of the existing staff and training new researches with a PhD. The share of students engaged in postgraduate studies is around 7 percent, still the share related to PhD studies is far lower.<sup>38</sup>

12. **Investing in ASET PhD programs can generate positive externalities crucial to Africa’s development. An increase in the share of skilled workers can generate spillovers that raise the productivity of non-skilled workers, increase government revenues and attract more investments.** For the United States, a one percentage point increase in the share of college graduates in a city was estimated to raise average wages of high school and tertiary graduates by 1.6 and 0.4 percent, respectively, beyond the private return to education.<sup>39</sup> Government tax income would also rise resulting from higher salaries and consumption, and individuals are less likely to receive social assistance. Furthermore, the availability of a more educated labor force contributes to attracting more investments that benefit the entire society, generating more employment opportunities for all.

13. **However, market failures can hinder investment in education, research and innovation. Improving the research capacity in ASET fields can have regional benefits, as it creates a mass of skilled workers who can focus on local challenges.** There are information asymmetries, and underinvestment in education arises as individuals fail to understand the actual returns to investments in higher education. Employment probability and wages might not reflect the actual productivity and skills level of employees, leading to underinvestment. Besides that, firms also have lower incentives to provide training due to the potential loss of talented workers. Second, investments in R&D involve risks, as the knowledge generated is often a public good. It is important to account for the benefits of creating the conditions for research capacity to develop and focus on areas that are key for the region development.

14. **Although investments in R&D can increase the productivity, support technology adaptation and promote competitiveness, SSA countries have the lowest research-to-population ratio when compared to others.** There are 88 researchers in R&D per million inhabitants in the region. In Tanzania, this number equals 18 researchers. The average for Latin America, East Asia and the Pacific, and Central and Eastern Europe reaches about 435, 1385 and 2070, respectively.

Table A.2: Researchers per Million Inhabitants

Country	
Botswana	176
Ethiopia	45
Ghana	39
Kenya	231

<sup>38</sup> Same as previous.

<sup>39</sup> Enrico Moretti. 2004. Chapter 51 - Human Capital Externalities in Cities, Editor(s): J. Vernon Henderson, Jacques-François Thisse, Handbook of Regional and Urban Economics, Elsevier, Volume 4, Pages 2243-2291.





Malawi	50
Mozambique	42
Senegal	361
South Africa	437
Tanzania	18
Togo	38
Uganda	38
Zimbabwe	90
<b>Region</b>	
Central and Eastern Europe	2070
East Asia and the Pacific	1385
Latin America and the Caribbean	435
North America and Western Europe	4050
Sub-Saharan Africa	88

Source: UNESCO-UIS database.

Note: Latest year available between 2010 and 2015, full-time equivalent.

### Regional initiative

15. **Governments from the region spend a significant share of their education budgets in tertiary education, however investments are not efficient.** SSA countries spend above the average for low and lower-middle income countries in the rest of the world, and comparable to the average upper-middle income countries spending. A few reasons arise to explain these elevated costs. First, budgets are spent on scholarships to study outside the region and they usually benefit students from richer families. Second, dropout and non-completion rates are high. Third, system management of human resources is inefficient, such as large number of nonacademic staff relative to students.<sup>40</sup>

**Table A.3: Spending on Higher Education**

Country	As a % of GDP	As a % of Government Expenditure in Education
Benin	0.97	22.15
Burkina Faso	0.55	13.65
Burundi	1.31	24.23
Côte d'Ivoire	1.08	21.44
Ethiopia	1.92	42.71
Ghana	1.13	18.27
Kenya	0.69	13.07
Malawi	1.36	24.21
Mozambique	0.89	13.69
Rwanda	0.79	20.86
Senegal	2.13	28.84
South Africa	0.73	12.19
Togo	0.90	17.33
Uganda	0.36	16.30

<sup>40</sup> World Bank. 2018. *The Skills Balancing Act in Sub-Saharan Africa: Investing in Skills for Productivity, Inclusion and Adaptability*. Washington, DC: World Bank.



Tanzania	0.74	21.40
Zimbabwe	1.42	16.83

Source: UNESCO-UIS database.

Note: Latest year available between 2010 and 2015.

16. **The benefits behind investing in a regional scholarship program include: students would stay in Africa, costs are lower, there are economies of scale, and smaller countries can benefit without incurring costs.** First, there are high returns to education and PhD programs in already established universities able to provide the required training within the region. Second, costs of tuition and living expenses are cheaper when compared to programs in developed countries. Although the quality might be relatively lower, the RSIF scholarship also includes a one-year sandwich program, allowing the student exposure to training outside SSA. Third, there are economies of scale as, individually, countries might find more difficult to invest in PhD programs in specialized areas.

17. **The scholarship program will focus on priority areas in ASET fields, to produce highly educated students while strengthening applied research capacity.** Investing in a few institutions with specialized teaching and research faculty that can host foreign students is economically feasible. Besides that, students from smaller countries could get the training they need, without the whole costs of investing in infrastructure and staff. A collaborative approach is expected to achieve better results in the long run.

#### Cost-Benefit Analysis for Subcomponent 2.1

18. **Although RSIF is designed at the regional level, this exercise focused on the impacts of the RSIF in three countries - Kenya, Nigeria and Rwanda.** Currently, four institutions from four countries - Côte d'Ivoire, Nigeria, Tanzania and Senegal – have been selected to host RSIF scholars. Besides that, as citizens from SSA countries who have a Master's degree may apply, it is difficult to establish the countries and right amounts where the benefits and costs will apply. This analysis assumes that the investments and benefits are captured by one country at a time. It captures a few different scenarios, as countries differ in terms of their economic, educational and labor market conditions.

19. **Benefits for subcomponent 2.1 are estimated as the private returns to the investment in a PhD, based on the wage premium between individuals who have a Master degree and PhD training.** Although the increase in the number of higher qualified workers can generate important externalities and have social impacts, these are more difficult to measure. Also, the project is expected to provide scholarships using the proceeds from the Permanent Fund, which are not considered in this analysis. However, by focusing on the returns to the scholarships financed by the General Fund, these estimates offer evidence supporting the later provision of scholarships.

20. **The costs refer to the project costs, that cover different expenses related to the PhD training.** While scholars might work, or receive other scholarships, the RSIF is expected to finance expenses related to a monthly stipend paid quarterly directly to the scholar to cover students' expenses, tuition paid directly to the host institution, and supervisor research support.

21. **The following conditions were assumed during the preparation of this cost-benefit analysis:**

- Scholarship beneficiaries have a dropout rate of 5 percent;



- Scholarship beneficiaries take 4 years to complete their PhD training and are expected to work for 35 years, starting the year after their graduation;
- Cost per scholar/year is US\$21,400, to cover for monthly stipend, tuition and supervisor;
- Average wages were calculated for workers, 18 to 64 years old, with university education or above, using the microdata from the World Bank DataLibWeb SSAPOV Harmonization;<sup>41</sup>
- The Central Bank discount rates are: 10 percent for Kenya (2018), 14 percent for Nigeria (2017), and 6 percent for Rwanda (2018);
- Exchange rates are assumed to be: 102.30 KES (Kenyan Shillings), 360.50 NGN (Nigerian Niras), and 849.40 RWF (Rwandan Francs) per 1 USD (US Dollar).

**22. The returns to education are high in SSA countries and, on average, higher for tertiary education compared to primary or secondary.** The average returns to schooling is higher for SSA countries (12.4 percent) when compared to other regions or the global average of 9.7 percent.<sup>42</sup> However, there is a lack of available data to disaggregate these returns for the different graduate levels as well as information related to the returns to graduate degrees in SSA. In this analysis, to account for differences in the returns to a Master’s and PhD degrees in each country, we used the average returns to tertiary education as a proxy. The average wages for tertiary degree (or above) holders were calculated and used as baseline for the wages after completing a Master’s or PhD program.

**Table A.4 Returns to Schooling, Average and by Education Levels**

	Returns to schooling	Primary	Secondary	Tertiary
SSA	12.4	14.4	10.6	21
Kenya	16.9	17.6	15.9	22.4
Nigeria	10.1	16.6	6.8	13
Rwanda	22.4	34.1	19.7	28.8

Source: Montenegro and Patrinos (2014).

**23. The evidence shows that while in other regions the average returns to schooling or at the tertiary level are lower than in Africa, the returns to postgraduate degrees are relatively high.** Lindley and Machin (2016) show that the postgraduate wage premium has increased over time in the United States. Moreover, using three data sources, they estimate the adjusted wage differential between postgraduates and college degree holders to range between 22.6 and 26.4 percent.<sup>43</sup> Song, Orazem and Wohlgemuth (2008) estimate the annualized returns to a Master’s or doctoral degree in the United States. After controlling for the likely endogeneity of schooling choices, such as the impact of the Graduate Records Exam (GRE) on the probability of pursuing a higher degree, they find annual returns to a Master’s degree to be 7.3 percent, while the annual returns to a PhD are estimated in 12.8 percent. In Brazil, Lima (2016) finds that the returns to a Master’s and PhD degrees are 13.1 and 17.7 percent, after controlling

<sup>41</sup> Source: SSA TSD/SSAPOV (2018). Survey IDs: KEN, 2005, IHBS; NGA, 2009, LSS; RWA, 2010, EICV-III. As of 24/01/2018 via Datalibweb Stata Package.

<sup>42</sup> Montenegro, C. E., and H. A. Patrinos. 2014. *Comparable estimates of returns to schooling around the world*. Policy Research working paper; no. WPS 7020. Washington, DC: World Bank.

<sup>43</sup> Lindley, J., and S. Machin. 2016. The Rising Postgraduate Wage Premium. *Economica*. 83. 281-306.



for selection bias using matching and difference-in-differences methods over a database of 432 thousand graduate degree holders and more than 12 million undergraduates.<sup>44</sup>

24. **Considering the private returns captured by scholars who decide to invest in a PhD, the Internal Rates of Return (IRR) of the scholarship program were estimated in 11 percent in Kenya, 16 percent in Nigeria, and 22 percent in Rwanda.** These estimates incorporate country differences in the returns to education and discount rates. However, because of the lack of data to disaggregate the returns to education for the different graduate degrees, they are an approximation based on the returns to additional years of schooling.

**Table A.5 Private Internal Rates of Return**

Year	Kenya			Nigeria			Rwanda		
	Costs	Benefits	NPV	Costs	Benefits	NPV	Costs	Benefits	NPV
2018	-	-	-	-	-	-	-	-	-
2019	817,091	-	(817,091)	750,877	-	(750,877)	807,547	-	(807,547)
2020	1,520,903	-	(1,520,903)	1,284,395	-	(1,284,395)	1,485,582	-	(1,485,582)
2021	1,377,322	-	(1,377,322)	1,068,885	-	(1,068,885)	1,329,621	-	(1,329,621)
2022	1,243,650	-	(1,243,650)	886,936	-	(886,936)	1,186,556	-	(1,186,556)
2023	576,601	3,796,307	3,219,705	377,893	3,314,632	2,936,740	543,705	4,660,632	4,116,927
2024	-	3,623,748	3,623,748	-	3,329,170	3,329,170	-	4,616,664	4,616,664
IRR	11%			16%			22%		

25. **Furthermore, the cost-benefit analysis mainly focused on the private benefits, measured as the expected life-long individual earnings.** Other expected benefits that are harder to quantify include improvements in the quality of life of graduates, their mobility, research and innovation capacity, and the impact on co-workers and knowledge sharing. Also, their prospective students can benefit from better qualified teachers, and firms from better qualified workers, which has an impact on productivity, future investments, and growth.

**Sensitivity Analysis**

26. **A sensitivity analysis was performed assuming different levels of returns to education, that could adversely affect the expected benefits of this subcomponent.** The sensitivity analysis may use different approaches to evaluate the feasibility of the project. Some of the assumptions can be modified, such as increasing the time to complete the PhD training, reducing the age of retirement of graduates, reducing the probability of employment, among others. In this analysis, it was assumed the wage premium between having a Master degree or PhD training was reduced by 10 and 20 percent, respectively.

<sup>44</sup> Lima, D. de F. P. 2016. Quanto vale uma Pós-Graduação Stricto-Sensu no Brasil? Os Efeitos fo Mestrado e Doutorado na Remuneração de seus Egressos. Tese de Doutorado. Rio de Janeiro, RJ: Fundação Getúlio Vargas – Escola Brasileira de Administração Pública.



27. **The NPV and IRR remain positive for the three countries considered in this analysis.** Although the returns to education in Sub-Saharan Africa are expected to be higher, this analysis shows, in the case of the opposite scenario, that the returns to the investment in a PhD training are expected to yield positive private returns.

**Table A.6 Sensitivity Analysis, IRR (%)**

	Kenya	Nigeria	Rwanda
Baseline Scenario	11	16	22
Wage Premium reduced in 10%	7	12	18
Wage Premium reduced in 20%	3	7	13

**Financial Analysis**

28. **The estimated cost of the RSIF project as a share of the public budget allocated to tertiary education is small.** As the project represents a regional initiative where the actual funds allocated to each country are not established yet, these estimates focused in the same set of countries selected for the cost-benefit analysis. Côte d'Ivoire and Senegal were included to compensate the lack of information for Nigeria. During the period of project implementation, the annual RSIF costs averaged around 1 percent of the total budget to tertiary education in all countries, except for Rwanda, where the average for the period was estimated in 5.6 percent. In 2019, the share of RSIF disbursements as a share of the government expenditures on tertiary education represented no more than 3.5 percent in Côte d'Ivoire, Kenya and Senegal, it reached a maximum of 20 percent in Rwanda.

**Table A.7 Financial Impact of the Project**

<b>Côte d'Ivoire</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Government expenditure on education as % of GDP	4.78	4.79	4.80	4.76	4.78	4.78
Government expenditure on tertiary education as % of GDP	1.09	1.07	1.09	1.09	1.09	1.08
Government expenditure on tertiary education, US\$, millions	452.6	496.3	544.3	596.8	654.4	717.6
Annual expected RSIF expenditure, US\$, millions	0.0	17.2	3.0	2.5	3.4	3.9
Share of RSIF expenditure as share of Govt. Exp. on Tertiary Education	0.0%	3.5%	0.6%	0.4%	0.5%	0.5%
<b>Kenya</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Government expenditure on education as % of GDP	5.34	5.32	5.33	5.34	5.34	5.33
Government expenditure on tertiary education as % of GDP	0.75	0.74	0.75	0.76	0.75	0.75
Government expenditure on tertiary education, US\$, millions	546.8	595.4	648.3	705.9	768.7	837.0
Annual expected RSIF expenditure, US\$, millions	0.0	17.2	3.0	2.5	3.4	3.9
Share of RSIF expenditure as share of Govt. Exp. on Tertiary Education	0.0%	2.9%	0.5%	0.4%	0.4%	0.5%
<b>Rwanda</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Government expenditure on education as % of GDP	4.34	4.20	4.07	4.13	4.23	4.20
Government expenditure on tertiary education as % of GDP	0.77	0.78	0.77	0.77	0.77	0.77
Government expenditure on tertiary education, US\$, millions	77.7	83.5	89.7	96.3	103.5	111.2



Annual expected RSIF expenditure, US\$, millions	0.0	17.2	3.0	2.5	3.4	3.9
Share of RSIF expenditure as share of Govt. Exp. on Tertiary Education	0.0%	20.5%	3.4%	2.6%	3.3%	3.5%
<b>Senegal</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Government expenditure on education as % of GDP	6.78	6.95	6.89	6.78	6.81	6.84
Government expenditure on tertiary education as % of GDP	2.10	2.03	2.01	2.02	2.03	2.04
Government expenditure on tertiary education, US\$, millions	464.7	507.7	554.7	606.1	662.2	723.4
Annual expected RSIF expenditure, US\$, millions	0.0	17.2	3.0	2.5	3.4	3.9
Share of RSIF expenditure as share of Govt. Exp. on Tertiary Education	0.0%	3.4%	0.5%	0.4%	0.5%	0.5%

Source: Analysis based on project costs, IMF-World Economic Outlook database and UNESCO-UIS database.

Notes: No data on government expenditures on education was available for Nigeria. The government expenditures on education and tertiary education as a share of the GDP were estimated based on the average for the previous five years (UNESCO-UIS database). It is assumed that the government expenditure on tertiary education will grow at the same rate as the GDP annual growth rate from 2010 to 2015.

29. **While RSIF costs represent a small share of the government expenditures allocated to tertiary education, the actual shares are expected to be smaller, as the costs will be distributed among several countries within the SSA region.** The costs of the project considered in this analysis consist of the US\$24 million related to project investments. However, these investments will be distributed among the host institutions, the regional coordination unit, and the beneficiaries of the scholarships research and innovation grants.