

Abstract

After the adoption of the Sustainable Development Goals(SDGs) in September 2015, the international community is constantly discussing measures to implement these broad goals. Particularly, Goal no. 17 is 'Strengthen the means of implementation and revitalize the global partnership for sustainable development' which addresses the specific targets for development finance, technology, capacity building, trade, and system issues to effectively achieve SDGs. As the international community's interest in the technology grows Science, Technology and Innovation (ST&I) receive attention as a way to solve development challenges in the fields of education, health, climate change and energy. In 2000, a OECD report revealed that technological progress and innovation are the causes of growth in the United States at 1990s. Discussions on how they can be utilized in development cooperation have taken place since 2007. In May 2010, the OECD's Innovation Strategy was established and Innovation and the Development Agenda was published. Since then innovation has been emphasized as a solution for poverty reduction and inequality.

Inclusive innovation aims to improve the welfare of low-income and underprivileged people and has five characteristics. It leads the poor to affordable access of quality goods and services, is sustainable and creates livelihood opportunities. Excluded population are able to access it and there is a significant number of outreach. In order for the innovation to be successful the product should respond to strong demand of the poor and investment in gaining a deep understanding of the requirements of the poor should be reinforced. Furthermore, developing a profitable business model is a priority and favourable regulatory conditions and private entrepreneurial initiative are critical. Open access to information infrastructures and utilization of existing infrastructure is also

required. Meanwhile, government can build sound environment for innovation by strengthening investment in innovation and fostering business dynamism, investing in and shaping an efficient system of knowledge creation and diffusion, seizing the benefits of the digital economy, fostering talent and skills and optimizing their use and improving the governance and implementation of policies for innovation.

However, donor countries do not provide large support to the field of ST&I in developing countries which is regarded a new solution to addressing poverty eradication and inequality. In addition, there is no generally accepted definition of aid for ST&I, so it is not easy to accurately calculate the amount of SI&I support to developing countries. If we look at the amount of aid for ST&I referred to the CRS code of the OECD statistical data that is considered to be related to ST&I development in developing countries its ratio is about 6% of total ODA. The fact that support for ST&I education is larger than support for ST&I research implies strengthening human resources capacity in the ST&I field is more critical. However, since this data does not include amounts that support other sectors using ST&I, the current status of aid for ST&I is not properly reflected. For the moment, ST&I is mainly applied to the fields of climate change, energy, health, food security and poverty eradication which requires the joint effort of the international community for the solution.

There are many bilateral and multilateral aid agencies that use ST&I to solve the development challenges and USAID is prominent. Development Innovation Venture(DIV) run by USAID finds innovation ideas from outside to solve social problems in developing countries. According to the nature of the proposed project, DIV divides project proposal into three stages from stage 1 to stage 3. Stage 1 supports a project with the proof of concept or initial testing and the project receives U\$ 25,000 to U\$ 150,000 for 2 years at maximum. Stage 2 supports a project of testing and positioning for scale and the project receives U\$ 150,000 to

U\$ 1,500,000 for 3 years at maximum. Stage 3 supports a project of transitioning proven solutions to scale and the project receives U\$ 1,500,000 to U\$ 15,000,000 for 5 years at maximum.

USAID received over 7,500 applications from July 2010 to 2015, of which 1.9%, a total of 142 projects were supported. Given that only two of the 100 applications are supported, DIV can be noted as a highly competitive program. Energy, economic growth, health and education sectors have received the highest amount of support and 52% of total support was provided to Kenya and India. In terms of grantees, four major grantees received 40% of the total support. As the fact that the J-PAL/IFMR and IPA, which carry out impact evaluation of development projects using Randomized Controlled Trial(RCT), have received the greatest support, the inclusion of impact evaluation in the project components is crucial for receiving DIV support. In terms of stages, DIV supported 83 projects of stage 1, 56 projects of stage 2 and 3 projects of stage 3.

Referring to the DIV Annual Program Statement(APS) applicants will write and submit Expression of Interest(EoI) to the USAID. The proposals that passed the first internal review will be eligible to write the full application. DIV staffs can join the preparation of the full application and suggest additional collaborative partners to the applicants when necessary. The submitted application will be reviewed by the USAID internal and external technical committee, and the Agreement Officer will finally select the beneficiary institution.

The application consists of Organization Information, Executive Summary, Project Description, Project Team, Leverage, Past Performance, Cost Application, and Attachments. Each section includes detailed instruction for fill-up. The Project Description section requires comprehensive explanation of measuring success and it implies that USAID considers the performance measurement important. After completion of the project all projects will be evaluated. Especially, stage 2 and

stage 3 projects should provide the evidence and evaluation result applying RCT. Therefore, the grant awarding organization must include an impact evaluation plan using the RCT in the project proposal, and the plan should contains specific evaluation methodology.

On the other hand, a evaluation framework solely for DIV does not exist but is included in a part of the evaluation framework of the Global Development Lab(GDL). The DIV program is intended to contribute to the intermediate result of GDL, high potential solutions produced. There are three indicators to measure the achievement of this result; the project results should show evidence level 3 or higher, there should be more than 100,000 direct beneficiaries and at least 50% of the finance should be mobilized from the external. However, there are no exact target figure for how many or what percentage of innovation projects should meet these indicators.

Among the DIV grantees, there is only one grantee received three rounds of tiered funding from stage 1 to stage 3 and it is Off-Grid Electric Ltd(OGE). OGE is running a solar energy business in Tanzania. Before entering the Tanzania solar energy market, OGE thoroughly analyzed the energy demand and business environment and identified what would hinder the expansion of solar energy business. OGE came up with the solutions in advance and built a business model taking them into account. The project achieved its goal for stage 1 and stage 2 and OGE confirmed the impact of the projects which is increased study time and net savings gains in households having used their products. The success factors of the OGE business can be analyzed in five areas; it has a clear profit model and an expandable technology and business model, it targeted a market which shows clear consumers' needs and business friendly environment, it made use of local infrastructure as much as possible and use a network solidly built up with their customers for sales and marketing activities.

Meanwhile, reflecting the Korean government's STI for better life initiative, Korea International Cooperation Agency(KOICA) introduced the Creative Technology Solution(CTS) program in 2015. CTS is the first innovation-inducing program of the ODA, and supports ideas development, production of prototype and commercialization of products and services that contribute to solving social problems in developing countries with innovative technology. CTS receives the business proposal from the public, categorizes them as Seed1 and Seed2 in two stages depending on the nature of the business and support ones selected. Seed1 supports projects aimed at the production of prototype, its commercialization and local partnership development utilizing innovative technology in the Bottom of Pyramid(BOP) market. It provides a maximum budget of 300 million won for 6 months to 12 months. Seed2 supports projects aimed at the development of business models that can be applied to developing countries by revising and improving innovative technologies of which performance in practical condition is proven and generate sales through pilot distribution. CTS provides a maximum budget of 500 million won for 6 months to 15 months.

The application procedure for CTS is as follows. KOICA will conduct preliminary screening after the receipt of online proposals. Subsequently, based on the internal examination criteria the proposals will be appraised and selected for the final screening. Then, after open pitching, basic training related to development cooperation, field survey and revision of the business plan, KOICA will carry out the in-depth examination and determine the final projects to support. KOICA will make contracts with selected companies for implementation of the projects, and the company will launch the project within two months after the contract is concluded.

The template for the proposal is composed of 6 sections, Overview, Explanation of Innovative Technology, Business Plan, Supporting Information, Past Performance and Budgeting. Although the contents of each section are almost the

same for each Seed, Seed2 requires more detailed business implementation plan as its final goal is the establishment of a business model. However, CTS does not emphasize performance evaluation as much as DIV. The enterprise should submit the monthly progress report, mid-term report and final report to KOICA and KOICA will conduct mid-term and final evaluation of the project based on these reports.

In order to find ways to improve CTS, this research includes in-depth analysis of projects implemented by IDIM International and Energyfarm, two grantees of CTS. They are both Seed1 project and titled 'development and supply of pico hydro – solar hybrid power generation system suitable for mountainous area in Nepal' and 'innovative solar home system for off grid households in Cambodia', which are similar to the solar energy business of OGE. IDIM has developed a stand-alone hybrid power generation system that combines several kW of ultra-hydro power and solar power, targeting small towns of 10 to 20 households in mountainous areas with difficult access to the national power grid, thereby solving their energy problems. Energyfarm has developed and supplied a solar power generation facility equipped with quality-improved batteries, which enables people not to rely on traditional energy sources such as petroleum, diesel, and coal.

At the time of this research was conducted, IDIM's final report was not submitted and therefore analyzing their performance was limited. On the other hand, setting the goal of the project to improve the efficacy of solar products, EnergyFarm has shown it achieved the target by using various performance indicators as verification indexes. However, these indicators are proxy for output, not outcome and it makes the distinction between output and outcome obscure. Furthermore, despite the feature that it is difficult to measure the outcome of Seed1 project PDM, a tool used for monitoring outcome, was applied to measure the performance of these projects. Therefore CTS might have to come up with measures to revise the evaluation framework of projects. In the meantime, in order

for IDIM and EnergyFarm to expand the business, it is necessary to look closely at obstacles in target market and seek solutions before establishing a sustainable profit model. In addition, they must actively utilize the local infrastructure to reduce the cost required for the sale support activities and strive to strengthen the capacity of the local sales organization. Finally, they have to collect and provide objective performance data so as to prove their achievement and exert effort to attract external sources.

If DIV and CTS are compared a few differences can be found. DIV mainly focused on face-to-face promotion, while CTS focused on online promotion. The DIV receives proposals from time to time throughout the year and undergoes review period of 6 to 9 months from the time of receipt of the application to the final decision making. CTS must receive proposals during the certain period that application opens to public. The application for CTS can continuously be revised and the final draft will be appraised at final review. It also takes 6 months for the project proposals of CTS to be selected. DIV supports Stage 1 project for two years at maximum, granting a total budget of U\$ 25,000 to U\$ 150,000 and Stage 2 project for three years at maximum granting a total budget of U\$ 150,000 to U\$ 1,500,000. However, CTS supports Seed1 project for 12 months at maximum granting a total budget of 300 million and Seed 2 project for 15 months at maximum granting a total budget of 500 million. The contents of the proposal of both program are almost the same, but DIV requires more detailed explanation for performance measurement. The review criteria for project proposal are also similar in both programs in general but DIV distinguishes the monitoring and evaluation as a large screening area. In the final report, the biggest difference between DIV and CTS is the evaluation. The DIV highly focuses on result assessments, including how the grantees measure achievement of goals and how they conduct impact assessments. Lastly, both the DIV and CTS do not have a result framework to assess the overall performance of the program. In the case of DIV, however, it is

a part of the GDL's evaluation framework and designed to contribute to the Lab's goal of supporting 10 solutions with evidence of impact. On the other hand, the result framework for evaluating the performance of the CTS has not yet been established.

Based on this analysis, a number of recommendations to improve CTS program are presented. First, it is necessary for CTS to strengthen face-to-face promotion to encourage the participation of sound startups. Second, the project period should be applied differently respective to the sectors so that the project can be successfully completed within the project period. Third, training sessions on plan, execution, and appropriation of budget should be provided from time to time to help companies reduce administrative burden. Fourth, considering that the final result of Seed1 project is development of prototype CTS should have flexibility to set a goal in PDM be different from the development impact. Fifth, it is necessary for CTS to preemptively identify the risk factors that might affect the achievement of milestone and to prepare countermeasures. Sixth, CTS's result framework should be developed and applied in order to monitor the performance of the program. Seventh, KOICA needs to be aware of the nature of the startups and ensure the companies to flexibly execute the budget. Eighth, KOICA should provide more detailed guidelines to the companies for writing a final report so that the report can contain more concrete and uniform contents. Ninth, project plan and final report should include clear evaluation plan. Finally, the companies should be encouraged to make business plans in a way to utilize various local infrastructures that already exist.