The 3rd International Evaluation of Strategic Basic Research Program

Evaluation and Recommendations

The 3rd International Evaluation Committee

January 29, 2016

Conclusion of the Committee

JST's Strategic Basic Research Program (SBRP) contributes to the creation of innovation in science and technology by effectively advancing basic research through the construction of virtual-network based research institutes in order to achieve the strategic objectives established by the national government. By the promotion of strategic basic research, the program has led to world-leading achievements, has produced numerous nascent technologies, and some of them reach practical application. The program has also produced many globally competent research leaders.

Overall, the SBRP has earned high marks for its significant contribution to the creation of innovation in science and technology. Going forward, the SBRP is strongly expected to continue and expand to develop science and technology in Japan.

Grade: ■E □VG □G □Not Good □NC
(E, VG, G, NG, NC) ＝ (Excellent, Very Good, Good, Not Good, No Comment)

1. Evaluation on System and Management

1-1. Vision and Objectives

Comment:
(1) JST, the core agency for promoting the Science and Technology Basic Plan, has the mission to contribute to the creation of innovation in science and technology. Central to executing mission is the SBRP, which specific purpose is to advance basic research for achieving the strategic objectives established by the national government and to initiate innovation in science and technology leading to social and economic change. The SBRP is therefore an appropriate and critical framework for executing national programs.

(2) In contrast to KAKENHI (bottom-up type research funding of JSPS), JST promotes top-down type research that prioritizes research fields and technologies where Japan is strong. The SBRP is well organized in selecting, promoting, and evaluating individual projects. Its vision is appropriate based on world research trends.

(3) "Mekiki" plays a very important role in the SBRP as indicated in the 2nd international evaluation. This seems to be a unique Japanese method, but the fact that the world's most influential researchers in Japan were supported by the SBRP proves that this implementation is very successful.

1-2. Program Structure

Comment:
(1) The SBRP builds virtual-network based research institutes (time-limited research organizations that go beyond organizational boundaries), by which the program officer drives research to achieve

strategic objectives. The virtual institute creates an interdisciplinary research networks by enabling researchers in academia, industry and national institutes to interact. Such interaction results in synergy. The system and scheme of the virtual-network based institutes are ingeniously designed and promotes good communication between researchers in the programs.

(2) The SBRP promotes each program on virtual-network based research institutes and has a unique operation scheme which is quite different from KAKENHI. The scheme is ingeniously designed to maximize science and technology innovation and research outcome. Each SBRP is properly designed, functions effectively, and usefully supports actual research activities. The diversity of schemes, such as the team-oriented CREST, the individual type PRESTO, and the Project Leader driven ERATO, promotes flexibility in research and brings out the special characteristics of various research projects.

(3) The SBRP is continuously being improved. A highlight was the launch of a new program, ACCEL in 2013. The purpose of ACCEL is to fill in the gap between the SBRP's basic research and the development research for commercialization and practical application. Although time is required for the effectiveness of this new program to be seen, the need fill in this gap is readily understood.

1-3. Program Operation

Comment:
(1) The operational organization and the role of PD, PO/PL system in ERATO, CREST, PRESTO, as well as the PM in ACCEL, are clear and critical for creating innovation. The different objectives and unique features of PD, PO/PL system in CREST, PRESTO, ERATO and ACT-C, as well as the PM management in ACCEL, account for a superior program operation.

(2) Various improvements in the programs and the operations, including responses to the recommendations in the 2nd international evaluation, are quite reasonable. The selection and evaluation of the projects were performed under proper schemes and were quite acceptable. The standard of selection and evaluation of research projects is appropriate and should be maintained going forward.

(3) The decision of selecting research projects falls to the Program Officer for CREST and PRESTO. This is Japan's own scheme and necessary for finding innovative researchers because creative proposals do not often win the consensus of all.

1-4. Other

Comment:
The fact that the budget per year for the SBRP after 2002 has levelled off could affect research promotion for the future innovation creation. Reviewers hope that the SBRP will increase the number of research areas in PRESTO despite the budget limitation.

2. Evaluation on Research Output and Outcome

2-1. Output and Outcome in terms of Contribution to Science and Technology

Comment:
(1) The research fields where Japan is strong include immunology, chemistry and material science. In terms of numbers, researchers in the SBRP dominate the total number of researchers studying in these fields, indicating that the SBRP is leading the way in world-class research in Japan and is therefore worthy of high marks.

(2)Many researchers in the SBRP have been domestically and internationally recognized with high-level awards, such as the Nobel Prize and the Saruhashi Award which is given to Japanese women researchers. This indicates that the SBRP is a significant contributor to value creation and the advancement of infrastructure development for science and technology in Japan. PRESTO has been instrumental in nurturing young researchers and has produced many next-generation research leaders.

2-2. Output and Outcome in terms of Contribution to Science and Technology Innovation Creation

Comment:
(1) The SBRP takes on high-risk and challenging projects to achieve innovation creation. An example of success that overcame many difficulties is the discovery of transparent semiconducting oxides by Hideo Hosono. One of them called IGZO (Indium gallium zinc oxide) is in practical use and incorporated into many liquid crystal displays.

(2) Based on the data for research areas /projects showing the numbers of expansion into joint research with corporations, the expansion into practical application projects such as NEDO and A-STEP, the acquisition of patent licensing and establishment of venture companies, it is shown that the SBRP contributes toward the creation of innovation in science and technology. The fact that the field of information and communications technology has yielded many venture companies as well as a large number of patent licensing agreements means that the research in this field is highly oriented toward applications for creation of innovation in science and technology.

2-3. Other

Comment:
Certain projects targeting further down-stream work should be backed by great efforts in filing patent applications and building up know-how. It would be preferable for even basic research projects to be extended to the subsequent funding level if they show promise in advancing to the translational research stage. Such continuity is important whereby JST could contribute to the funding of such a "value chain" in science and technology.

3. Comprehensive Evaluation and Recommendations

Comment:

JST aims to contribute to the creation of innovation in science and technology by promoting basic research to produce creative seeds and bridging the research outcome to the development carried out by enterprises seamlessly as a core agency in conducting the Science and Technology Basic Plan.

The SBRP promotes basic research in order to create the seeds of new technologies aimed at achieving the strategic objectives through top-down type research in contrast to bottom-up type research funding (KAKENHI). The program constructs and operates virtual research institutes which are time limited research organizations spanning organizational boundaries. It can also be seen that the program has been changing its system and operation to seamlessly bridge promising basic research outcomes to the development of their practical use, and has further accelerated research.

The operation system and the roles of PD, PO/PL of ERATO, CREST and PRESTO in the SBRP are clear and very critical important for the creation of innovation in science and technology. CREST, PRESTO, ERATO, ACT-C and ACCEL have different purposes and their own unique respective concepts, and these systems excel in the creation of innovation. The operation of research area/project based on the PO/PL initiative with the support of JST staff is quite unique from a global standpoint.

Since many scientists among the world's most influential researchers are supported by the SBRP in the research fields in which Japan excel, the research of the SBRP has reached a world leading level and earned an excellent reputation. As many researchers have received prestigious international prizes and high profile domestic awards, the SBRP greatly contributes to nurturing scientists in Japan.

JST sincerely responds to the recommendation of the 2nd international evaluation and their actions toward reform and improvement are highly evaluated. It is certainly expected that the SBRP will continue and expand in order to develop science and technology in Japan.

Overall, we believe that the SBRP makes a significant contribution to the creation of innovation in science and technology.

Recommendations:

(1) The SBRP seems to have shifted its emphasis towards applications, but there were already many seeds for applications in the JST report, even when the SBRP was organized towards more basic research. Therefore, for future innovation creation it is desirable that wider strategic basic research advancement is reflected in the national government policy, while practical use is simultaneously considered.

(2) While the world is facing enormous challenges in area such as aging population, energy and environment, urbanization, healthcare and advanced manufacturing, nowadays it is important to participate in international collaboration or consortiums to solve these issues. JST is promoting international collaboration within the scope of the recommendations in the 2nd international evaluation. It is recommended that JST conducts strategic funding and promotes international collaboration hereafter.

(3) It is necessary to show not only data on scientific and technological outputs but also data on system and operational outputs in order to evaluate programs. In order to create an innovation ecosystem it is recommended that JST should invest in developing human resources for program evaluation and the analysis of JST's own data.

(4) It would be useful for the evaluation to have a range of metrics agreed for each program against which progress/success can be measured and to identify what metrics are expected by continued examination of the evaluation methods used in agencies abroad.

(5) The ratio of women among researchers is still low, though the SBRP has produced many successful women scientists. More effort is probably needed to increase the number of women researchers

(6) It is recommended that JST would further supports young assistant professors, postdoctoral fellows and young researchers including graduate students who aspire to work in the field of science. JST should channel more resources to fund promising young scientists.