

Grants-in-Aid for Fostering Creative Research

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Once when dining with Dr. Heinrich Rohrer, the 1986 Nobel laureate who developed the scanning tunneling microscope (STM), he mentioned how wonderful he thought it was that Japan had “recently” added large increases to its research funding, but wondered if there wasn’t a problem with the way in which grant disbursements were evaluated. Asking Dr. Rohrer why he thought that way, he said that he had first become aware of the problem through an article in *Nature*; and that after coming to Japan and looking into it himself, he felt that it was a rather serious problem. He expressed particular concern as to whether an effective system of evaluation was being used to select the recipients of research grants.

I myself also feel concern about how project research (group research), which has recently been receiving funding priority, is evaluated; that is, by placing emphasis on the overall research project with little consideration given to the creativity of the individual researchers. In contrast, the competitive funding program Grants-in-Aid for Scientific Research is designed to disburse funds for autonomous research based on the researchers’ own free ideas. Under it, a process of scientifically impartial screening is used to make grants to researchers with a lofty level of creativity, the aim being to foster and advance excellent research initiatives.

Looking back at my own research on amorphous metals, when I started it in 1971, “metals” had been scientifically defined as “crystals.” In such an era, I wondered what would happen if metals were put into an amorphous state (non-crystalline state), and wanted to try to see what would happen if metals in an amorphous state were strengthened. It was this curiosity that prompted me to initiate research on amorphous metals. This was the same time that I was promoted to a professor in the Institute for Materials Research at Tohoku University. However, the research lab to which I was assigned did not have any of the equipment needed to conduct experiments, much less sufficient research funds to use at my discretion, so I took about one year to build rapid-cooling and strength/deformation-measuring equipments, etc. I was completed

the cooling device by using an old vacuum cleaner motor to drive it. For my initial research, I only spent the small amount of a few tens of thousand yen. If I was to purchase those devices these days, it would probably cost more than 20 million yen. The Grants-in-Aid program did of course exist at that time. I did applied for a grant under the program but were rejected because the content of my project defied convention wisdom. It was in 1975 when I finally was selected for a grant under the Basic Research (A) category. The grant-supported project was entitled “Research on the Strength, Deformation and Toughness Mechanisms of Non-Crystalline Structured Metals” With this grant, I was able to continue and advance our work on amorphous metals.

It is the purpose of the Grants-in-Aid program to support the creative and original ideas of researchers by providing them with needed amounts of research funding at times when they need it to advance their work. In this vein, I have benefited greatly from the Grants-in-Aid program.

From the 1990s the amount of the Grants-in-Aid has been increased year by year, reaching 200 billion yen in 2010. This has added up to a four-fold increase since 1989. It was during this period of rapid increase in Grants-in-Aid invested in researchers at universities and other research institutions when Dr. Rohrer pointed out the problem he perceived with Japan’s research-funding system.

Recent data on the Grants-in-Aid program have begun to show unbalances in disbursements between universities, regions, academic fields, basic and applied research, and big and small science. There also appears to be partiality in the investment of more funding than needed to certain universities and researchers.

Looking at 2009 selection data, among the projects selected for Grants-in-Aid, about 26% were major universities (former imperial universities), with about 50% of the disbursements going to the top 30 universities. As the grants made to these institution are for relatively large-scale projects, the percentage of funds going to them in even larger. Grants going to the national universities made up 59% of the total. This percentage had decreased somewhat since 2004, when these grants accounted for 62%. Nevertheless, the disparity between the national and private universities is still very large, with the latter receiving only 23% of the grants.

Against this background, there are more grant applications from national universities (54%) than private universities. As, however, it is important to attain diversity among

the scientific research fields most conducive to advancing the free ideas of individual researchers, it is desirable to make grant selections from a wide variety of applications submitted by many universities including private and regional universities. If unbalances and disparities exist in the disbursement of Grants-in-Aid, then it is a problem that should not be overlooked, particularly from the perspective of strengthening Japan's overall research capacity. Emphasis should be placed on remedying the problem. This said, there are those who assert that the disparities merely reflect the increase in research funding and are the result of rigorous application screening, so they do not pose a particular problem. However, to really know for the first time whether or not grant distribution is being carried out effectively will require the conducting of post-project evaluations.

Another significant problem is the marked tendency toward grant requests for applied research with strong objective orientations, amidst less emphasis on basic scientific research. Of course, it is important to link applied research to basic research with an aim of feeding back investments from the national treasury into society. However, this should not be done in a way that sacrifices researcher creativity and originality. When I began my research on amorphous metals, no one could have predicted that they would be used as practical materials in a wide variety of applications. Some 30 years later, amorphous metals are now being mass-produced as practical materials. They have given rise to new industries for producing the iron core of energy-saving transformers and the electrical power components of electronic devices and have been used widely in the world. This productizing of new materials, which started from simple curiosity, owes its success to steadfast funding support for basic research from the Grants-in-Aid program.

Having emerged from the status of a postwar subsidiary of Western research, Japan must now pioneer its own unique research domains and modalities. The role of Grants-in-Aid, which places value on the creativity of researchers, will become increasingly important as this process moves forward. To optimize the effectiveness of the Grants-in-Aid program will require a comprehensive system of evaluation, one that includes fair and forward-looking application screening coupled with rigorous post-project evaluation.