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Another Role of Grants-in-Aid:  
Feeding Research Fruits into Society

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As I left the research and teaching arena some ten years ago, I do not at present have any direct connection with Grants-in-Aid for Scientific Research. That said, however, I remain very interested in the role of Grants-in-Aid, the impact they exert on society, and the direction they will take as the program moves into the future. My interest overarches the influence that Grants-in-Aid have on the implementation of scientific research; in a broader sense, I want to see how the program will go about carrying out its critical role of building Japan's basic infrastructure for supporting a full gamut of scientific advancement.

*My First Grant-in-Aid*

Over the 34 years from the time of my first appointment as a research associate in 1966 to when I reached retirement age in 2000, I benefited greatly from the Grants-in-Aid Program. During my last year as an undergraduate and five years as a graduate student, I was always able to use research funds in conducting my experiments. As they covered all my necessary research expenses including the reagents and instruments, I was happily free of concern about money. After becoming a research associate, however, I found that the faculty flat-rate funding allocation and other available research funding was not sufficient to advance my research work, so in consultation with my supervisory professor, I applied for a Grant-in-Aid. As my first applications were all rejected, I got a taste for how difficult it is to successfully secure a grant. Four years on, I was finally able to obtain a million yen grant. I can still remember the elation I felt at that time.

It was in 1969 when I first received that first grant for developmental scientific research on the “application of polyacetylene film in semiconductors.” The research representative for that project was my supervisory professor Sakuji Ikeda. The grant was issued under an applied, not basic, research category as we would use it to conduct experiments. We had first used our faculty flat-rate funding to do our research on the mechanism of acetylene polymerization. Through a serendipitous failure in that experimental process, we learned that polyacetylene film could be synthesized. Using this film as a test piece, we found it surprisingly easy to elucidate the polymerization mechanism. At the time, polyacetylene was already known for its application in standard semiconductors. Captivated by the metallic luster of the polyacetylene film, I consulted with Prof. Ikeda about an idea of analyzing its properties with an eye to applying the film in semiconductors. Therefore, we applied for the developmental scientific research category of Grants-in-Aid.

### *Grants-in-Aid in Transition*

Back then, there was not an abundance of research funding that could be used to experimentally verify one's ideas, to focus on specific research themes, or to carry out germinative research. Therefore, university researchers had to make do with their faculty flat-rate funding. When that funding proved to be insufficient, one had no choice but to rely upon requests for Grants-in-Aid. In this respect, Grants-in-Aid have transitioned to play a vital role in advancing germinative and basic research. In 2000, the faculty flat-rate and student prorated allocation systems were replaced by the new education/research basic funding allocation calculus, which I hear is making university research funding even more restrictive, especially since the incorporation of the national universities in 2004. More and more, researchers are forced to depend on competitive funding to cover a large part of their research costs. This has made the mission of the Grants-in-Aid Program even more critical than when I was actively engaged in research.

Under the severe financial conditions prevailing in Japan, the government is looking for ways to reduce the national budget. For that purpose, it has set up a “Revitalization Unit” to screen and streamline government-funded programs. Not being sacrosanct within this process, the budgets of quite a few S&T-related programs have been reduced if not eliminated. Fortunately, however, the government recognized the relative importance of the role Grants-in-Aid play in advancing science, so it approved the program’s full FY2010 budget request in a record amount of ¥200 billion. Looking back, when I received my first experimental research grant in 1969, the annual budget for the Grants-in-Aid Program was a poles-apart ¥6 billion.

#### *Grants-in-Aid as a Tax*

Though I had no particular reason for doing so, over the 34 years that I was using Grants-in-Aid, I kept a detail record of its funding along with that I received from corporate scholarship contributions and other sources, so that just after receiving notice in October of 2000 of being selected for the Nobel Prize I was able to immediately publish the record.

Altogether, I had received 24 Grants-in-Aid for a total amount of ¥69 million. While some researchers expressed surprise that this amount was so small, other regular folks remarked, “Research sure does cost a lot of money, doesn’t it.” In addition to this Grant-in-Aid money, I also received ¥79 million from JSPS’s University-Industry Research Cooperation Program, ¥11 million yen in grants for five projects while I was at the University of Tsukuba, and ¥20 million in scholarship contributions from corporations. This adds up to ¥180 million that I spent on my research. Estimating that I received another ¥60 million in faculty flat-rate funding over that period, it would bring the amount up to ¥240 million. I can only wonder that the figure would be if I were to add in my salary over those 34 years.

Reflecting back at the time I was about to retire, it occurred rather vividly to me that most of the Grants-in-Aid I had used and salary I received came from taxes. Whereas I had made some moderate contributions to society over the course of my career, there was not much that I had done for the public in repayment of its tax contributions. I had talked about my research in certain community forums, but had not really done much to proactively disseminate my research to society.

The research representatives of projects funded by Grants-in-Aid are obligated to submit reports on their research results. These reports are maintained at the National Diet Library and in the libraries of affiliated institutions and circulated among colleagues, but nothing about the research ever reaches the eyes the general public.

### *Feeding Research Results Back into Society*

I would like to suggest requiring researchers to write reports on their research results in a way that is easy for even high school students to understand, while widely disseminating within society information on the nature and role of Grants-in-Aid.

Unfortunately, *Gakujutu Geppo* (Japan Scientific Monthly) published by JSPS was discontinued with its March 2008 edition. In the October 2006 special edition on the Current State of the Grants-in-Aid, I contributed an article titled “How to enhance public understanding of the Grants-in-Aid Program.” Two imperatives that I highlighted in that article were a need to prepare research reports oriented to the general public and to move forward in implementing a program that gives high school and junior high school students an opportunity to experience the results of Grants-in-Aid research.

In FY 2005, JSPS had launched a program with the long name HIRAMEKI ☆TOKMEKI SCIENCE (Welcome to a University Research Lab—Science That Inspires and Inspirts). These lab visits help high school and junior high school students to understand the results of research activities carried out with Grants-in-Aid funding through easy-to-understand lectures and hands-on experiments. While allowing the students to get a firsthand taste for the life and work of researchers, the visits also help to deepen their scientific interest and comprehension. In the first year of the program, it got off to a modest start with 35 student lab visits at 22 universities. The program was quickly shown to be effective in “killing two birds with one stone.” On one hand, it provides a valuable experience for the students, while on the other, it gives the university researchers and the graduate students who assist them in running the experiments an opportunity to explain in a simplified manner their research activities to children and adults in the general public—in contrast to the kind of presentations they are used to giving at academic meetings. The program’s initial success led to expanding it to fifth and sixth graders, making even more lively the experiments carried out by the students. By FY 2009, not only universities but also inter-university research institutes were participating in the program. That year alone, 208 student lab visits were carried out at 123 institutions. If you’d like to know more about this program, please see its website: <http://www.jsps.go.jp/hirameki/>

As mentioned, I used ¥69 million of Grants-in-Aid during my 34-year university tenure. As I recall, I was able to obtain one grant for about every three applications I submitted. Given this ratio, I believe that the scale of the Grants-in-Aid Program should at least be doubled, if not tripled. To further increase the Grants-in-Aid budget, it will be necessary for researchers themselves to, as the beneficiaries of the program, inform the public of the immense societal significance of Grants-in-Aid and to appeal directly to society for its understanding and support. Doing this, I’d like to stress, will be more important than ever in the months and years ahead.