Advisory Opinion

Support and Environment Development for the Cultivation of Doctoral Talents in Chemistry Leading Japan's Society and Industry

Creating a Movement for Strengthening the Layer of Doctoral Talent through Collaboration Among Industry, Government, and Academia, and Cultivating a Positive Image Towards Advancement to Doctoral Programs

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Science Council of Japan
Committee for Chemistry
Subcommittee on Chemistry Planning

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This English version is a translation of the original written in Japanese.

EXECTIVE SUMMARY

This advisory opinion summarizes our current understanding of issues related to doctoral programs and enrollment in doctoral programs based on quantitative evidence. Based on this evidence, information and measures are proposed for solving these issues concerning students, parents, universities, the Ministry of Education, Culture, Sports, Science and Technology, and the industrial sector.

1. Background

Japan's economic and scientific stagnation, coupled with falling wage levels, is partly due to a slowdown in research capabilities and industrial innovation, and a shortage of talent aspiring for independence and innovation. The number of doctoral degree holders and the rate of advancement to doctoral programs continue to decline. Although financial support for doctoral students is increasing, there is still a lack of sufficient measures to address non-economic factors discouraging advancement and the employment of doctoral graduates in companies. To address this issue, specific analyses and measures in fields starting with chemistry are proposed, with the expectation that these can be extended to other academic areas.

2. Current Situation and Issues

In Japan, the number of doctoral degree recipients has been decreasing for over 20 years, and this trend is correlated with the declining enrollment rate of master's program graduates. By international comparison, Japan's trend is in contrast to other countries and unusual. According to a NISTEP survey, the desire for economic independence and employment anxiety are the top reasons for avoiding doctoral studies, but measures to address these issues are still insufficient. There is a discrepancy between students' perception and the actual state of corporate employment, and misunderstandings about the treatment of doctoral graduates are contributing to the decrease in enrollment rates. Furthermore, there is a lack of social understanding about the qualities and expected roles of PhDs, which is believed to be at the root of these issues.

3. Content of the Advisory Opinion

In this paper, to propose actions that should be taken to increase enrollment in doctoral programs based on quantitative evidence, we utilized not only publicly known data but also conducted our own unique survey on the attitudes towards doctoral studies specifically in the field of chemistry.

(1) Establishing an Environment for Early Economic Independence and Social Status Improvement in Doctoral Programs

- Provide doctoral students with a level of compensation that allows them to feel economically independent (e.g., salaries at the level of master's program graduates in public service) and modify the Research Assistant system (hereinafter referred to as “RA”).
- The new system will be linked with the quality assurance of doctoral programs.
- Ensure and inform to students that they will receive an income through RA employment before they make career decisions including employment etc. in their master's programs.

(2) Eliminating Post-Doctoral Employment Anxiety and Fostering Confidence

- The Ministry of Education, Culture, Sports, Science, and Technology (MEXT) surveys the employment rate of doctoral students in companies through the Basic School Survey and show the actual employment situation of doctoral graduates in objective numbers.
- Conduct surveys with technology development companies to investigate the recruitment rate of doctoral talent and their ratio in advanced technology development departments, revealing the active roles and future hiring plans for PhDs. This will promote spreading social awareness of the features and actual situations of companies where PhD can play such active roles, and future prospects of PhDs in such companies.

(3) Policies to Demonstrate Personal Economic Impact

- Investigate extensively and publish the annual income data for holders of technical degrees.
- Expand tuition waivers for doctoral programs and increase corporate scholarships to develop students with a secure environment to focus on their research.
- Provide students with information about financial supports they would receive before their master's job-hunting activities to encourage motivation for enrolling in doctoral programs.

(4) Elevating the Value of Graduate Education

- According to a survey conducted by our committee etc., students tend to value their graduate education and research more highly after graduation, and, on the contrary, tend to experience a decrease in future anxieties. We aim to inform these statistical data to students, enhance their recognition of the value of graduate education, and encourage enrollment in doctoral programs.
- Promote job-based recruitment and shift to year-round/career hiring in collaboration with industry and academia to increase the number of young talents who have acquired advanced education and research skills in doctoral programs.

(5) Fostering Independent and Innovative-Minded Talent

- According to a survey by our committee, doctoral graduates tend to have higher levels of autonomy, curiosity, and a sense of accomplishment compared to master's graduates. We plan to share these results with primary and secondary education stakeholders and strive to improve and enhance education in STEAM fields to nurture these qualities.