

11. Empirical Research on Career Development of Science Majors with High Academic Credentials: Examining the Problem of Unemployment among Persons with High Academic Credentials
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(1) Purpose and Aim of Study

Some individuals with high academic credentials are forced to join the ranks of the unemployed due to mismatching in the labor market. For society, this phenomenon represents a waste of highly talented human resources, while from the perspective of the affected individual this signifies an unanticipated failure in career development and formation. From this perspective, this study focuses on majors in theoretical physics whose job opportunities are limited to the field of research and undertakes to (a) investigate and analyze the career development of such persons, (b) identify problems related to persons with high academic credentials that become unemployed on account of their highly specialized training, and (c) formulate proposals and recommendations for addressing this problem.

(2) Outline of Research Results

- The study covers physics majors and consists of the following three principal sections: (a) interview survey of post-doctorate (PD) students, (b) survey of cases of career changes using open-ended questionnaires, and (c) joint web-based survey conducted with the Physical Society of Japan targeting members of the Physical Society of Japan.
- A review of the number of persons completing doctoral programs in physics points to two distinct periods of sharp increase. These consist of the first period of sharp increase (1970s) and the second period of sharp increase (after 2000). A marked upsurge in PDs is seen after each of these periods.
- Compared to the first period, the second period of sharp increase can be characterized as follows: (a) presence of a larger number of PDs, (b) decrease in number of full-time posts available to young researchers and increase in short-term employment due to the incorporation of national universities and other developments, and (c) higher age of PDs due to

increase in project-type competitive funding and other temporary sources of research funding.

- Due to the growing gap between supply and demand of full-time academic posts, it is clear that a certain number of PDs have no choice but to find employment outside the academic world. However, it is very difficult for such PDs to change their career course for the following reasons.
 - (a) The career development process of physics PDs tends to be finalized at an extremely early stage with very little second-guessing or veering off course. Once the decision is made, physics majors become highly focused on pursuing careers in research. As such, physics majors follow an early-decision type career path.
 - (b) The better the student, the better the chance of continuously receiving research funding. Access to ample research funds and free time to invest in research means that the best PDs will remain highly motivated and will expect to find a full-time post through their mid-thirties. However, by their late thirties, a sense of growing anxiety and despair in career outlook sets in. In other words, physics PDs are already relatively old when they begin to think of shifting to other careers because their research funds are beginning to dry up.
 - (c) Those PDs who are looking for employment elsewhere generally tend to have low satisfaction levels. This group is characterized by higher levels of anxiety regarding “future outlook” and tends to have a higher incidence of depression compared to PDs who intend to continue research. A review of the reasons why members of this group begin to look for other employment indicates that anxiety and pessimism for the future combined with tendencies toward depression are major motivating factors in wanting to switch careers.

Anxiety and insecurity among PDs originates in the inability to develop future plans. To allow PDs to engage in research with a sense of security, it is essential to present them with a viable outlook for the future. This study points to the importance of developing specialized career-support systems, including psychological support, that match the characteristics and age-based needs of physics majors with high academic credentials. Furthermore, the study indicates that information facilitating career changes must be provided at an appropriate timing.