

## Study on Member Enterprises in Joint Research and Development Projects

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### 1. Introduction

Japanese firms have carried out a number of joint R&D projects. The government, on its part, has supported these activities through various ways. For example, The Research Association System for the Development of Mining and Industrial Technology instituted in fiscal 1961 and other systems instituted to suit the stage of research and development of their time have effectively supported the firms' joint R&D. As joint R&D among firms become more active in the United States and the European countries, they begin to show increasing interest in the Japanese counterparts.

As an increasing number of international conflicts on science and technology surfaced, it has become more important for every country to secure the balanced access to the knowledge, technology, information, markets and capitals. Freer access to the research and development activities of the Japanese firms has been internationally demanded, in particular, by the United States, because the private enterprises play the major role in Japan's research and development.

Against such a background, this study conducted a basic survey and analysis mainly on the behaviors of firms participating in such research and development activities jointly promoted by private enterprises and other organizations, and intended to find a clue to the solution of the problem of access. In view of the difficulties in determining the number of joint R&D projects and in collecting data, this study focuses on the joint R&D projects which were promoted by the government.

### 2. Outline of Institutions for Supporting Joint Research and Development

Table 1 summarizes the systems which may support firms' joint R&D projects in the fields of advanced technology. Implementation of certain projects covered by the Large Scale Project Institution and the Future Industries Project Institution has been consigned to relevant research associations. Some of the projects covered by the Research Association System are given subsidies.

### 3. Behavior of the Member Enterprises

The member companies of the projects, mainly under the institutions in which private enterprises are main players, were surveyed and analyzed.

#### (1) The Composition of Participating Firms (per project)

Table 2 shows composition of private enterprises per project by type of industries. The large number of participants for the projects promoted by the Research Association System may be explained partly by the wide range of research themes (from basic technology to systematization) and partly by the large scale of the projects. In the cases of those consigned under the Large Scale Project Institution and the Future Industries Project Institution, listed enterprises overwhelmingly outnumber unlisted enterprises. This is presumably because technological and financial capabilities of candidate companies are evaluated in the selection of participants. By contrast, in the projects under the jurisdiction of the Ministry of Agriculture, unlisted enterprises mainly participate.

The small number of participants for the projects under the Bio-technology Research Advancement Institution and the Adverse Drug Research Suffering Relief & Drug Research Promotion Fund may be explained by nature of the R&D which mainly develop

basic technologies. There are a number of participants from unlisted enterprises, foundations (0.3), universities and colleges (2.9) and foreign countries (1.8) in projects under the Exploratory Research for Advanced Technology. This is presumably because the projects under this system are promoted by individuals participating in them, rather than enterprises as in the cases of other system.

#### (2)Types of Industries of Member Enterprises

Table 3 shows the results of study on combinations of industries in the same and different types. There is a growing tendency for different industries participating in joint research and development projects under the Research Association System. The similar trends are seen in the joint research and development projects under the Japan Key Technology Center recently established.

#### (3)Combination of Research and Development Fields (Technology Fusion)

By designating the industry group from which the greatest number of enterprises participating in a project as the main industry group and also designating the industry from which the second greatest number of enterprises participating the project as the subordinate industry group, their combinations were analyzed. Table 4 shows the types of combination in the projects under the Research Association System. The total, 94, checks with the number of projects. In case the number of participants is equal between the different industry groups, then the main industry groups and subordinate industry groups are both two or more. Table 5 summarizes the combination between the fields of research and development and industry groups of participants.

A variety of combinations of different industry groups are seen in such field as new materials, biotechnology and electronics under the joint research and development institutions of the Japan Key Technology Center. The shipbuilding and precision instrument industries in the field of new materials, the construction, textile, nonferrous metals and shipbuilding industries in the field of biotechnology, and the chemical, glass and ceramics, and iron and steel industries in the field of electronics are noteworthy examples.

#### (4)Participation of the Same Industry Group

Generally, the larger in terms of capital and the more diversified a firm is, the more projects it participates in. The projects may be classified into two kinds; namely, the kind of projects in which almost all major companies participate and the kind of projects in which one major company participates throughout (See Table 6 and Figure 1). This is because all of the major companies in the same industry participate in research and development projects which directly concern their industries; and in the fields which concern diversification, one company tends to participate as a representative of that industry.

The projects which concern diversification but in which major company together participate represent fields of research and development common to diversification of all participants. The degree of diversification and the degree of achievement of research and development in the given field being about the same presumably constitutes an important factor for the joint participation of all major companies.

### 4.System for Promotion of Research and Development and its Stage

We did opinion surveys on the governmental support under the Research Association System. The location where research and development is promoted may be broken down into two cases: a case in which one common laboratory promotes the work and the other case in which the participants execute their respective parts at their own places. Regarding the relation among participants, cooperation, division of work and competition are conceivable.

Possibility of outsiders' access was studied with respect to the degree of research and development from the basic research to commercialization. Whether the concerned project is at the pre-competitive stage or at the competitive stage may be an important factor for

private enterprises regarding this question.

Regarding the relation between the system of support and phase of R&D, the case in which one common laboratory does the job represents research and development at the pre-competitive stage and the case in which the participants do their respective parts at their own places represents those at the competitive stages. We can infer that joint R&Ds which are carried out within the industry are more pre-competitive than those which are between the industry.

Figure 2 presents a general picture of the relation between the three factors and stage of joint R&Ds.

## 5. Conclusion

As more and more cases of international conflicts on the issue of science and technology surface recently, securing of symmetrical access is being recognized as an important policy objective. The term "symmetrical access" is meant to indicate a system in which every country has access to the knowledge, technology, information, markets, and capitals and others necessary for technological innovation. The demand from abroad, notably that of the United States, may be summarized as follows.

The concept of "pre-competitive research and development" which the United States says is not necessarily clearly understood in Japan. It is important for us to have a clear and systematic definition and to become able to adequately deal with international conflicts on science and technology.

It is important to further clarify the relation shown in Figure 2 by conducting a more detailed study and analysis on the location of research and development with respect to the degree of achievement, and conditions for cooperation, division of work, and competition in the joint project, and the relation between the companies in the same industry group and that between those in the different industry groups. It is also important to establish in Japan the concept of "pre-competitive research and development" that is applicable not only to joint projects among private enterprises but also to other forms of projects. Through such endeavors an approach to the policy toward international conflicts on science and technology may be developed in a sequence as shown in Figure 3.