Are the factors affecting outcomes different for each technology area?

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Introduction

As an innovation accelerator agency under the Ministry of Economy, Trade and Industry in Japan, New Energy and Industrial Technology Development Organization (NEDO) has a mission to accelerate the commercialization of research and development (R&D) results by private firms. NEDO establishes and manages about 70 national consortium type projects in both "energy and global environment" and "industrial technology" areas yearly, which are mainly R&D activities.

NEDO conducts the follow-up survey for 6 years after the end of the project to monitor the post-project activities of the project participants and gain feedback to improve NEDO's R&D management.

The follow-up monitoring directly determines the present status of the project ranked as a 5-level TRL-like stage; 1) still under elementary research, 2) technology development, 3) already practically applied, 4) successfully commercialized, or 5) terminated (abandoned). By using this classification to all NEDO Projects, we estimate the success rate (expected probability of success) of NEDO projects.

This Study's Objective

To know the effects of energy/environment and energy/environment for the achievement of outcomes after project and the discontinuing R&D activities just after completing the project, analyze the following items from the results of follow-up monitoring.

1) The status change of project result.
2) The discontinued factor of R&D activities.

The Status Change of Projects

For the NEDO projects which ended in FY2001 – FY2010, the status change of each project is surveyed and summed up for both energy/environment and energy/environment groups. The 5-level status classification is rearranged to three levels to clarify the tendency of the status change; "Discontinued" = stage 5), "Continued" = stage 1) and 2), "Commercialization" = stage 3) and 4).

For both types of areas, the expected behaviour is that the ratio of "Continued" decreases continuously with the time, whereas that of "Discontinued" increases. The action for "Commercialization" is not so simple.

The discontinued factor of R&D activities

fFor those projects abandoned just after the end of the project, we asked additional questions; what do you think is the factor that led the project to be “Discontinued”? The result shows the affecting factors are different for energy/environment and other industrial technology projects. In energy/environment projects, solving the cost problem was more critical, and in other industrial technology projects, it was more important to gain the understanding of managers.

Discussions

The behavior of “Commercialization” ratio, does not change monotonously but shows the peak value at four years after the end of the project for both energy/environment and energy/environment area groups.

The right-hand side of the graphs show the cumulative ratio of “Commercialization”, that counts all cases that is at least once in “Commercialization” status at any moment of the survey period.

A significantly higher value of the cumulative ratio and the presence of the peaks at four years later means that a certain percentage of projects change its “Commercialization” status, or “reverse” the position during the monitoring period. A close look at the graphs finds the amount of decrease in the “Commercialization” ratio from year 4 to year 6 is significantly larger for the other industrial technology group (18.6% - 17.6% = 1.0%) than for energy/environment group (22.4% - 22.2% = 0.2%).

The average speed of innovation can explain this difference in both areas. For energy/environment type projects, newly developed technology needs longer time to compete and eventually replace the existing technology, because the objective in this area is fixed for energy saving or reduction, for example, and should take some time to catch up and overwhelm the cost. For the other industrial technology type projects, the output gives more or less a new quality that does not necessarily have to lower the cost by gradually increasing the production scale. The quicker adaptation to the market of other industrial technology type projects may cause the earlier maximum “Commercialization” status ratio at around four years after the end of the project before the output of the next technology replaces it.

The difference in the economic environment explains the apparent difference in discontinued factor between energy/environment and other industrial technology area groups. In energy/environment projects, solving the cost problem was more important. In other industrial technology projects, it was more important to gain the understanding of managers that results in the changes in the business strategy.

Reference

Motoshi Kunugi, Toshiyuki Isshiki, Shumpei Miyajima and Shin Uesaka, ”Quantitative and qualitative analysis for R&D process toward crossing the Darwinian Sea”, Evaluation2018, (2018)