

# Improvement of New Government R&D Program Plans through Preliminary Feasibility Studies

Hyun-Kyu Kang

**Abstract**—As a part of an evaluation system for R&D programs, the Korean Government has applied the preliminary feasibility study to new government R&D program plans. Basically, the fundamental purpose of the preliminary feasibility study is to decide that the government will either do or do not invest in a new R&D Program. Additionally, the preliminary feasibility study can contribute to the improvement of R&D program plans. For example, 2 cases of new R&D program plans applied to the study are explained in this paper and there are expectations that these R&D programs would yield better performance than without the study. It is thought that the important point of the preliminary feasibility study is not only the effective decision making process of R&D program but also the opportunity to improve R&D program plan actually.

**Keywords**—Preliminary feasibility study, Government R&D program.

## I. INTRODUCTION

THE Korean Government has increased the R&D budget drastically and supported the expansion of the private sector's expenditures on R&D. The R&D budget of the Korean Government has expanded from 4.2 trillion Korean won in 2000 to 16 trillion Korean won (equivalent to about 14 billion dollar) in 2012. However, the quantitative increase of R&D investment could not lead the qualitative improvement of the performance of R&D. So, the Korean Government wanted to enhance the efficiency of R&D investment.

Due to the huge budget size and complex characteristic of the R&D programs, the government has a burden of decision making for the investment of a new R&D program. In Korea, the preliminary feasibility study is applied to demonstrate the feasibility of large-scale, long-term public investment R&D programs and also to enhance fiscal efficiency and their productivity since 2008. In 2008, under the President's executive order, it is carried out as preliminary feasibility study for the newly proposed government programs with concrete plans on science and technology development whose budget is over \$50 million and whose government subsidy is over \$30 Million. The preliminary feasibility studies have been performed to predict the potential results of implementations of R&D programs [1]. This system is conducted to raise the effectiveness of government R&D investments by selecting R&D programs that has high viability, by analyzing previously R&D program plans before carrying forward them.

The preliminary feasibility study is positioned between a national science & technology plan and periodical evaluation in the lifecycle of R&D programs. Once a national plan for a specific science & technology area is set up, a government department makes a program proposal for carrying out the plan. Only for the programs which get through the preliminary feasibility study system acquire a qualification of a budget investment.

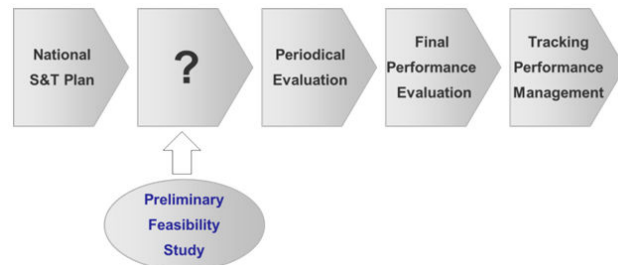


Fig. 1 The position of the preliminary feasibility study in the lifecycle of R&D programs

In the preliminary feasibility study on new government R&D program plans, 3 major criteria are applied to measure not only economic effects but also effects in aspects of technology and policy [2]. Technological analysis, policy analysis and economic analysis are performed independently and results of these analyses are reviewed and combined to deliver the final results. AHP (Analytic Hierarchy Process) method has been utilized as a means to collect decision-making information for R&D programs in the preliminary feasibility study [3]. We can make a conclusion based on the result of AHP method that government will either “Do invest” or “Do not invest” in new R&D programs from next fiscal year.

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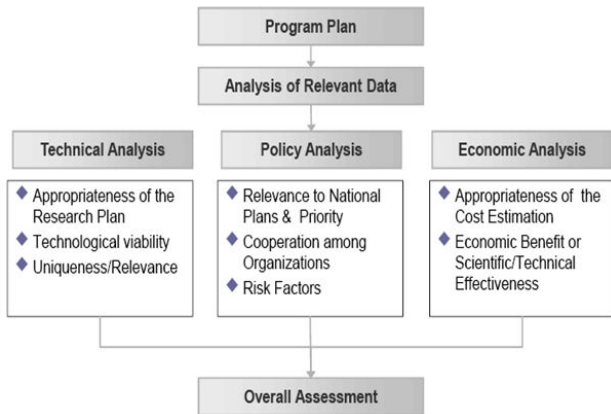


Fig. 2 The general procedure of the preliminary feasibility study

KISTEP (Korea Institute of Science & Technology Evaluation and Planning) has played the main role in the preliminary feasibility study on R&D programs with the Ministry of Strategy and Finance from 2012 and has developed the standard guideline of the preliminary feasibility study.

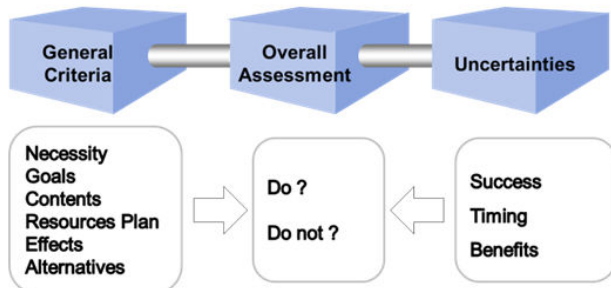


Fig. 3 The concept of the preliminary feasibility study

## II. CONTRIBUTION OF THE PRELIMINARY FEASIBILITY STUDY ON THE PLANNING OF GOVERNMENT R&D PROGRAMS

The fundamental purpose of the preliminary feasibility study is to decide that the government will either do or do not invest in a specific R&D Program proposed by a government department. In addition, this study can contribute the improvement of an R&D program plan by complementing its small drawbacks during the preliminary feasibility study process.

For the preliminary feasibility study on a specific R&D program plan, a nationwide professional group is composed and not only professionals in the technological field of the R&D program but also professionals in policy and economic field participate in the group. This professional group evaluates the necessity, goal, contents, R&D strategy, budget of the R&D program plan and analyses uncertainties such as success, investment timing, benefits, and finally makes a decision either to "Do" or "Do not" invest in the R&D program plan.

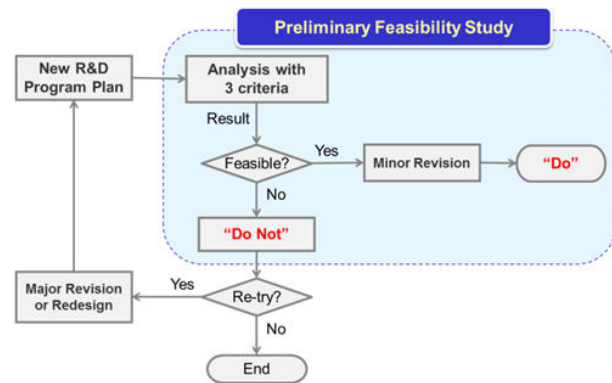


Fig. 4 The decision making process of the preliminary feasibility study

Because almost every R&D program plans are not complete, the professional group asks the government department who proposed the program plan to submit more materials such as detail documents, evidential data, references, etc.

If the qualitative level of a program plan is good enough, minor revision is required to improve its completeness and the professional group makes a decision as "Do" on the program plan. Typical minor revisions are the reduction of a program budget and the elimination of sub-programs that have high overlap possibilities with other programs or projects.

On the contrary, if the qualitative level of a program plan is so low that the major revision or the redesign of the program plan is demanded, the professional group makes a decision as "Do not" on the program plan.

In this case, however, the R&D program is not lost the funding opportunity forever. After the preliminary feasibility study, the professional group publishes a report on results of its study. If the government department revises or redesigns the R&D program plan to reflect the results of the former preliminary feasibility study, it could be applied again to the preliminary feasibility study process.

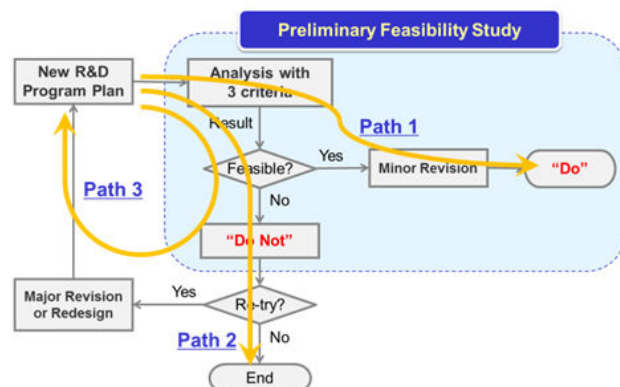


Fig. 5 3 paths of a R&amp;D program plan during/after the preliminary feasibility study

Therefore a new R&D program plan goes one path among 3 paths during/after its preliminary feasibility study. 1<sup>st</sup> path is that a plan obtains "Do" decision. 2<sup>nd</sup> path is that a government department to propose a plan gives up re-trying the study after

receiving “Do Not” decision. 3<sup>rd</sup> path is that the government department re-tries to apply the study by redesign the R&D program plan after “Do Not” decision.

### III. CASE STUDIES

In this paper, different preliminary feasibility study cases on new 2 R&D program plans (A, B) will be explained.

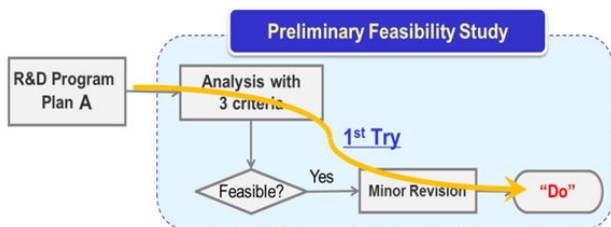


Fig. 6 Case 1: R&D program plan A

The R&D program plan A was related to the development and demonstration of a novel iron making process that could reduce the CO<sub>2</sub> emission. The topic of this program was very important for the green growth. Details of this program plan were insufficient a little bit, but the planning process, the goal, contents, economic effects of this program was obviously good. So, the professional group asked the government department to submit more materials in detail. In conclusion, the most contents of this program were constructed well and for “Do” decision some minor revisions were just needed.

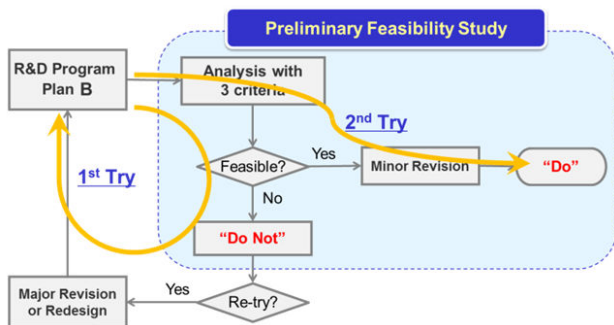


Fig. 7 Case 2: R&D program plan B

The R&D program plan B was related to the development of underwater construction machines that could be utilized to construct structures in subsea by a few hundred meters below sea level. This program plan was applied firstly to the preliminary feasibility study 2 years ago. But its contents were very insufficient to recognize the goal and technical development plan, and there were so many technological items without a proper R&D strategy in detail. Also the benefit-cost(B/C) ratio deduced from the economic analysis was very low. So the professional group judged this program plan unfeasible and gave “Do not” decision to it.

After the first try, this program was fully redesigned to reflect results of the former preliminary feasibility study and was applied again to preliminary feasibility study as a new R&D program. In conclusion, the latter program plan was

better than the former and for final “Do” decision minor revisions were just needed.

### IV. CONCLUSION

The preliminary feasibility study is considered a very important process to raise the prospect of success and to enhance the effectiveness of R&D programs. Because in many case R&D program plans were improved through preliminary feasibility studies, we are expecting better performances of these R&D programs later on. Also, it is believed that the preliminary feasibility study will contribute to improve planning abilities of R&D programs of government departments.

### REFERENCES

- [1] Y. B. Lee, J. Hwang, “A Study on Correlation between Elements of AHP for Government R&D Programs,” Proceedings of the International Symposium on the Analytic Hierarchy Process, 2011.
- [2] Seongmin Yim, Hyun-Kyu Kang, “Feasibility Analysis Studies on New National R&D Programs in Korea,” World Academy of Science, Engineering and Technology, 2011.11.14.~16, Paris, France, pp.698~700.
- [3] Thomas L. Saaty, Luis G. Vargas, *Decision Making with The Analytic Networking Process; Economic, Political, Social and Technological Applications with Benefits, Opportunities, Costs and Risks*, Springer, 2006.