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# An Economic Feasibility Study on the Research Infrastructure Project for the ICT Device Industry Reliability

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***Abstract***

*The research infrastructure project for the ICT device industry reliability is aimed to secure and establish the reliability of the ICT device industry, reinforce the competitiveness of domestic ICT device companies and expand their growth power in domestic and global markets. It is necessary to enhance and expand test and evaluation services for the domestic devices developed by small and medium-sized companies such as bench-mark test, certification test, function and performance verification test, delivery test and development assistance in improving the entrance of domestic ICT devices into the global market and their reliability, and it is imperative to establish the test evaluation infrastructure. The purpose of this study is to implement an economic feasibility study on this project of the research infrastructure for the ICT device industry reliability. The result of the economic feasibility analysis shows that the cost-benefit ratio (1.510) shown in table 3 is larger than 1, which indicates that it has more benefits than cost. And by the additional what-if analysis, this project shows its economic feasibility.*

***Keywords:*** *ICT Device Industry Reliability, ICT Research Infrastructure Project, Cost-benefit Analysis, what-if analysis, economic feasibility analysis*

## 1. Introduction

The research infrastructure project for the ICT device industry reliability is one of IT and communication research infrastructure projects of Korea. It is aimed to help establish the research infrastructure for the ICT device industry reliability, reinforce the competitiveness of domestic ICT device companies and expand their growth engine [1].

To improve the quality of domestic ICT devices and help excellent domestic devices land on global markets, it is required to secure expensive testing environment for the provision of test evaluation services and the governmental support environment for the development of test technology and test evaluation service.

Test evaluation services including bench-mark test, the certification test, the function and performance verification test, the delivery test, and the development support for the domestic devices developed by small and medium companies (SMCs), should be enhanced and expanded. In addition, governmental support is essential for establishing the infrastructure of test evaluation services.

Since the establishment of performance evaluation test environment to support the commercialization of ICT devices of SMCs and improve the quality of the products has the characteristics of public goods, governmental support is indispensable. Support for bottleneck technology and test evaluation technology, and establishing test environment require large amounts of investment. And support for the commercialization of SMCs products and the quality improvement asks for closer support services through establishing various test beds and open labs.

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This study is aimed to carry out the economic feasibility analysis on the research infrastructure project for the ICT device industry reliability on the basis of project planning reports.

## 2. Cost Analysis

### 2.1. Project Period and Input Budget by Year

This project will be carried out for a total of five years from 2014 to 2018. The budget for each year is as seen in Table 1.

This project is set to cost a total of 16.6 billion Korean Won but the share of the private sector's contribution had not been determined. The total duration of the project is five years, with 3.320 billion Won being put in each year.

**Table 1. Project Size for the Project Year (Unit : Million Won)**

| Category | | 1st Yr. | 2nd Yr. | 3rd Yr. | 4th Yr. | 5th Yr. | Total |
|---|---|---|---|---|---|---|---|
| Project Costs | Government | 3,320 | 3,320 | 3,320 | 3,320 | 3,320 | 16,600 |
| | Private Sectors | | | | | | |
| Total | | 3,320 | 3,320 | 3,320 | 3,320 | 3,320 | 16,600 |

### 2.2. Cost Analysis

This project consists largely of several sub-tasks including ICT device development support services, ICT maintenance test and certification services, ICT device market penetration, human resources development and various technical supports. Unfortunately, the details of the planning reports are not specific enough to understand the budget plan for sub-tasks and carry out propriety analysis.

**Table 2. Budgets Comparison with the Similar Projects**

| Similar Project | # of Projects | Budget (million won.) | Project Duration |
|---|---|---|---|
| Service for Development Support | 5 | 1,918.8 | 2010~2014 |
| Testing and Certification Services | 5 | 2,008.7 | 2009~2013 |
| Market penetration | 2 | 2,940.2 | 2011~2013 |
| Human Resources Development | 4 | 366.4 | 2006~2013 |
| Center Construction | 7 | 2,101.1 | 2004~2014 |

In addition, this project is a new one so that it is impossible to compare it with the existing same projects. Therefore, this research compared and analyzed its input budget with similar projects by item to test the suitability of budget assigned. This study searched the National Technical Information Service [3] by sub-project to find similar projects and found out that the budget assigned for this project is lower than that of the similar projects (See Table 2.).

 

# 3. Benefit Analysis

## 3.1. Benefit Analysis Model

Qualitative and quantitative benefit analysis was conducted to identify the benefits from the research infrastructure project for the ICT device industry reliability.

Benefits can be classified with direct and indirect benefits; direct benefits represent the effects of the project and indirect benefits are secondary benefits resulting from direct benefits [4].

Direct benefits could be obtained as various forms like the increased products, quality improvement, costs savings, location improvement, and so on.

In this study, direct benefits and indirect benefits were tried to be identified together and the formula to calculate the benefits was set as follows [5]:

Benefits = direct benefits + indirect benefits

- Direct benefits: Economic benefits by the costs savings to be practically reduced are classified to direct benefits
- Indirect benefits: Employment benefits and added values which are created from the production in the entire industry are classified as indirect benefits.

## 3.2. Application of the Benefit Analysis Model

In order to calculate the benefits, the following data and assumptions were used.

For costs, the entire budget that would be invested over the duration of the project was used.

The discount rate for each year was 2.0% [6] which was the average economic growth rate in 2012. This was used to convert the figures of the budget into the present value for 2014. The cost-savings rate was set at 20% [7].

For the value-added effects, the value-added rate of 94.5% for 'business-related special services' was used [8] from 'revenues and value-added coefficient table' in the 'producer price-comprehensive categorization-transaction table and various coefficients' [9].

As for employment effects, Bank of Korea's Industry Figure for 2010 (published in 2012) was used. This figure was 12.3 people for every investment of 1 billion Won in an industry categorized as 'medium' in terms of technology level [10]. In order to estimate in monetary units of the employment benefits, the average annual salary for new recruits in the industry of communication and broadcasting, 32.15 million Won, was applied [11].

# 4. Cost-Benefit Analysis

In order to analyze the economic value of this project, a cost-benefit analysis was conducted. This analysis framework is one of the most general and comprehensive one that is commonly used when assessing government policies. It estimates the costs and benefits of various policies and proposes the best alternative [12].

**Table 3. Cost-Benefit Analysis Table (Unit: 100 Million Korean Won, %)**

| Project Year | Input Budget | PV of Cost | PV of Accumulated Costs | Cost-saving (20%) | Value-added return | New Emp. | Benefits | PV of Benefits | PV of Accumulated Benefits | **B/C** |
|---|---|---|---|---|---|---|---|---|---|---|
| Yr. 1 | 33.2 | 33.2 | 33.20 | 6.64 | 31.37 | 13.13 | 51.14 | 50.14 | 50.14 | 1.510 |
| Yr. 2 | 33.2 | 32.55 | 65.75 | 6.64 | 31.37 | 13.13 | 51.14 | 49.16 | 99.30 | 1.510 |
| Yr. 3 | 33.2 | 31.91 | 97.66 | 6.64 | 31.37 | 13.13 | 51.14 | 48.19 | 147.49 | 1.510 |
| Yr. 4 | 33.2 | 31.29 | 128.94 | 6.64 | 31.37 | 13.13 | 51.14 | 47.25 | 194.74 | 1.510 |

 

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Yr. 5 | 33.2 | 30.67 | 159.62 | 6.64 | 31.37 | 13.13 | 51.14 | 46.32 | 241.06 | 1.510 |

Since this project plans to have the budget invested over the five years from 2014 to 2018, a discount rate was applied to calculate the present value of the input amount, which was then placed into the benefit calculation formula to conclude the present value benefits.

The result of analysis shows that the benefit to cost ratio (1.510) in table 3 is larger than 1, which indicates that it has more benefits than cost.

## 5. Additional Analysis and Conclusions

Based on the possibilities of change in cost-savings rate and discount rate used in calculating the benefits of this project and the assumption that the benefit will last at least a year after the completion of this project, the changing effects of costs and benefits were analyzed as follows.

### 5.1. Additional Considerations for the Variables

**5.1.1. Variable 1 - Cost-savings Rate:** Cost-savings rate used in this analysis model is assumed to be 20%. However, cost-savings rate is variable depending on the technical performance of 'the research infrastructure project of ICT device industry reliability'. Therefore, what-if analysis is carried out for three cost-savings rates: 20% of initial cost-savings rate; 25% of cost-savings rate in case of higher technical performance of the project than initially set; and 15% of cost-savings rate in case of lower technical performance of the project than initially set.

**5.1.2. Variable 2 – Discount Rate:** Discount rate was initially set to 2.0% based on economic growth rate. However, what-if analysis was conducted under 3 discount rates considering the world economy change (2.0% for initial case, 2.2% for growth case and 1.8% for depression case).

**5.1.3. Result:** It turned out that the economic feasibility of this project can be met (B/C ratio reaches 1.461) if at least 15% cost-savings rate is achieved, which is lower than 20% cost-savings rate initially assumed. In addition, even when what-if analysis was carried out at 2.2% discount rate in case of economic growth, which is greater than initial discount rate 2.0%, the economic feasibility of this project can be met with B/C ratio to be 1.507.

**Table 4. What-if Analysis**

| Cost-saving rate / Discount rate | 15 % | 20 % | 25 % |
|---|---|---|---|
| 1.8 % | 1.464 | 1.513 | 1.562 |
| 2.0 % | 1.461 | 1.510 | 1.559 |
| 2.2 % | 1.458 | 1.507 | 1.556 |

### 5.2. The Analysis of the Benefits Sustainability

The benefit of the project was calculated under the assumption that it will end when the project completes. However, it can last longer even after the completion of the project. Therefore, a new assumption (benefit can last at least one year after the completion of the project) was put in the benefit analysis.

 

Therefore, even when the changes of variable 1 (cost-saving rate) and variable 2 (discount rate) are placed in consideration, it turned out that the economic feasibility can still maintain in the 6th year of the project.

**Table 5. The Analysis of the Benefits Sustainability**

| Cost-saving rate / Discount rate | 15 % | 20 % | 25 % |
|---|---|---|---|
| 1.8 % | 1.747 | 1.805 | 1.864 |
| 2.0 % | 1.742 | 1.800 | 1.859 |
| 2.2 % | 1.737 | 1.796 | 1.854 |

### 5.3 Conclusion

As known in what-if analysis above, even when cost-savings rate is 15%, not 20%, B/C ratio is 1.461, which indicates the project is economically feasible under the condition. In addition, even when it is assumed that economy will grow (discount rate increases from 2.0% to 2.2%), B/C ratio turns out to be 1.507, which indicates the project is economically feasible under the condition.

Therefore, even when the changes of variable 1 (cost-saving rate) and variable 2 (discount rate) are placed in consideration, it turned out that the economic feasibility can still maintain.

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