Measuring the Efficiency of Public Expenditure:

Evaluation on the Government Program in Korea

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CONTENTS

Part I | Introduction

Background

Wide areas of government's task in modern economies

- Effective division of labor between public and private sector is needed
- Important to set priorities under budget constraints
- Increasing awareness on 'accountability' of government expenditure

Korea's situation

- Strong government in the economic development during the last 40 years
- Change in the role of government after financial crisis
- Widened coverage of public expenditure and needs to enhance efficiency
- Strengthened efforts for performance management and performance evaluation system

Aims of Paper

This paper

- reviews the background and current state of performance evaluation system in Korea
- describes the current system of in-depth evaluation of budgetary program (IEBP)
- exemplifies the IEBP through a case of evaluation study on a R&D program for SMEs
- suggests recommendations for the future improvement of IEBP and performance management system

Part II Performance Management and Program Evaluation in Korea

Performance of Management

Why manage performance?

- Possibility of inefficiency in public expenditure due to monopolistic position
- Public expenditure needs to be managed properly and efficiently
- Top-down budgeting increases the autonomy of line ministries and emphasizes the importance of management

Four steps of performance management

- Setting performance targets
- Designing the details of government program
- Implementation of the program
- Assessment of program performance (monitoring, review and evaluation) : feedback into the first and second stage

Three-tier System of Performance Management in Korea

Performance Management of Budgetary Programs (PMBP)

- An annual review of program's goal and performance indicators annually
- Annual performance plan and indicators are reported to MOSF and examined
- Simple check of indicators, but not of the causal relationship between input and output

Self-Assessment of Budgetary Programs (SABP)

- Self-assessment of program by line ministries on the basis of guideline
- A kind of program review by definition of OECD (2003)
- Composed of 15 questionnaires and 1-4 additional ones according to the type of program
- Provide information for the central budget office

In-depth Evaluation of Budgetary Programs (IEBP)

- Systemic and analytical evaluation of all the aspects of programs (OECD)
- The number of programs being evaluated is limited due to time and cost constraints

In-depth Program Evaluation in Korea

Purpose and method

- Introduced in 2006, IEBP aims to analyze various aspects of programs by using scientific and systematic techniques
- After evaluation, judgment on the necessity of government intervention and recommendations are made.
- By request of MOSF, program evaluation division at KDI is responsible for managing the whole process of IEBP under cooperation with MOSF and the corresponding ministry

Main issues

- Relevance: Check of the objectives and needs of program and policy relevance
- Efficiency: Examination of the efficiency of program
- Effectiveness: Evaluation of program's impact for the realization of goals
- Utility: Is the demand satisfied as a result?
- Sustainability: How long will the positive effect last?

Process of IEBP

General process

Choice of programs being evaluated by MOSF	Organization of evaluation teams by KDI	Midterm and final report to the MOSF
	- Provide manual for the program evaluation - Management of evaluation	- Discussion among research team, MOSF and the line ministry

Close cooperation with the program's ministry is needed

- Difficulty in obtaining required data may hinder the evaluation
- Therefore, line ministry's cooperation is essential for the successful implementation of IEBP

Process of IEBP

Application of evaluation results

- Rationalizing the program planning and implementation process
- Enhancing the efficiency in budget distribution
- Ensuring the responsibilities of government expenditure

Role of IEBP in management system

- IEBP provides information for SABP and utilizes SABP for selecting the programs for IEBP
- IEBP may propose refined indicators for PMBP and utilizes information gathered through PMBP

Programs under IEBP

Programs under IEBP

- From 2006 to 2007, total 20 programs are evaluated by IEBP
  - ✓ Wide coverage of areas
  - ✓ MOSF tends to distribute the programs relatively evenly across ministries
- Budgetary size is not essential criterion
  - ✓ About half of the programs have a yearly budget of less then 100 mill dollars
- Period of program implementation varies from program to program
  - ✓ A half of the programs have been in practice for 4 to 10 years before being evaluated
- In principle, IEBP is conducted for a single program
  - ✓ But, 8 programs containing 3 or more unit programs have also been evaluated

Part III Evaluation of a R&D program for SMEs

Background of Evaluation

Background of evaluation

- Importance of SMEs as an economic actor both for growth and job creation
- Establishment of SMBA as an independent ministry and increase of public expenditure to support SMEs
- Recently, SME policy has oriented towards promoting R&D capability of SMEs through various measures
- Sharp increase in budget and coexistence of programs by different ministries have raised the issue of efficiency
- MOSF decided to conduct IEBP on ‘SMEs’ Technological Innovation Development Program’ (SMTI), a central R&D program of SMBA

Background of Evaluation

Government's R&D Support to SMEs

(Unit: 100 mill KRW)

	2001	2002	2003	2004	2005	2006
Total government R&D budget (A)	46,794	49,720	45,529	48,569	60,163	72,258
SMBA Budget (B) (Its Share in A)	1,311 (2.80%)	1,587 (3.19%)	1,740 (3.82%)	2,121 (4.37%)	2,317 (3.82%)	2,679 (3.71%)
R&D Support through KOSBIR (C)	5,083	5,154	5,563	6,354	7,938	8,267
B+C	6,394	6,741	7,303	8,475	10,255	10,946
(B+C)/A	13.7%	13.6%	16.0%	17.4%	17.0%	15.1%

Overview of SMTI Program

SMTI provides public grants to the R&D projects undertaken by SMEs

- Targets a wide rage of SMEs in manufacturing and services
- Government can finance up to 75% of the total cost of proposed R&D projects, and firms finance 25%

Two types of grants

- General Projects are selected on the bottom-up basis and can have max. project cost of about 100 thousand USD for 1 year
- Strategic Projects are selected by the mixed approach and can have max. cost of about 300 thousand USD for 2 years

Overview of SMTI Program

KDI

Total Investment through SMTI Program

Categories	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 (Plan)	Sum
Program Budget (100 mil. KRW)	300	323	450	600	861	990	1,101	1,587	1,422	1,596	1,995	11,225
Supported Projects (Number)	683	647	857	1,013	1,313	1,566	1,676	2,312	1,912	2,034	2,136	16,149
Budget per Project (100 mill KRW)	0.44	0.50	0.53	0.59	0.66	0.63	0.66	0.69	0.74	0.78	0.93	0.70

Overview (continued)

Selection criteria for grants

- Both technological and commercial aspect of the project are considered
- Evaluation by an independent committee

Various actors are participating

- SMBA is responsible for the whole program, and regional SMA are managing the projects in general
- Project selection and final evaluation is organized by a third-party institute (ITEP)

Final evaluation

- After the end of support, each project is evaluated on the success or failure
- If evaluated as success, firms should repay 20% of the SMTI grant as a kind of ‘royalty’ and possess the IPR

Main Issues of Evaluation

Policy relevance of the program

- Is it relevant as a role of government?

Effectiveness of the program

- Effectiveness of the selection process
- Effectiveness of the SMTI grants

Efficiency of the program

- Duplication with other financing possibilities and other government programs

Logic Model of the Program

Logic model

- A series of logical chains from input through process to output/outcomes
- Helps evaluators grasp the logical structure of the program and identify its performance indicators

Logic Model of the SMTI Program

Input	Process	Output	Outcome
• Government Grant • Firm's own R&D investment	• R&D activities • Collaboration with other actors	• Success of R&D projects • Intellectual Property Right (Patent etc.) • Commercialization	• Strengthening Technological capability and R&D capacity • Improvement of firm's business result (sales and employment)

Logic Model of the Program

Program evaluation tries to measure the outcomes of the program

- Indicators in SABP represented for the output measures
- This evaluation study measure the program impact through outcome indicators such as sales and employment.

Evaluation of Policy Relevance

Ground for government's SME policy

- Efficiency vs. equity perspective
- Equity perspective emphasizes disadvantages of SMEs in the market and regards general support as indispensible for the retention of SMEs
- Efficiency perspective sees the SME policy as a tool to correct the coordination failure in the market and to enable further economic growth
- Efficiency perspective incorporating market mechanism actively is to be the central argument for the SME policy, but not equity perspective
- In this respect, policy instruments to support SME's innovation activities are important part of SME policy (OECD, 2004; Rodrik 2000).

Evaluation of Policy Relevance

Government intervention from the R&D perspective

- Correction of market failure is one of the role of government
- SMEs face difficulties in financing due to imperfect knowledge on them
- Government support for SMEs to overcome financing obstacles can have policy relevance
- Other financing sources (i.e. venture capital) has not sufficiently developed, so SMTI funds are useful for the R&D-conducting SMEs

The case of SMTI Program

- Both from the SME policy and R&D policy perspective, the SMTI program can have policy relevance.
- However, direct support in form of grants may lead to government failure
- Thus, it should have an effective program design in order to choose adequate recipients and minimize moral hazards on the side of recipients

Evaluation of Program Effect

Focus of evaluation

- Evaluation of project selection : How effective was the project selection?
- Evaluation of program effect : Which impact had the SMTI grant on the performance of recipients?

Data

- Data of grant awardees and non-awardees (1997-2007) from ITEP, combined with the firm-level data in KIS (Korea Investors Services)
- Due to data constraints, data from 2002 to 2007 were used for analysis (total 15,920 firms are listed)
- Control group : Firms that applied for SMTI grants but did not receive

Evaluation of Program Effect

Methods

- The problem of selection bias : Better outcomes of recipients than non-recipients may result from their superior characteristics
- How to overcome this issue : Various techniques exist to control it
  - ✓ Instrumental variable (IV) method
  - ✓ Propensity score matching techniques
  - ✓ Difference-in-differences method etc.
- Following the evaluation study on SBIR by Wallsten(2000), two-stage least square model using IV was used

Evaluation of Program Effect

Model

- 1st stage: $D = \alpha_1 + \beta_1 X_i + \beta_2 Z_i + \lambda G + \varepsilon_i$
  - ✓ *D* : SMTI grant dummy
  - ✓ X_i, Z_i : firm's and project's characteristics affecting the selection
  - ✓ *G* : 'competition rate' variable (in relation with 2nd stage estimation)
  - ✓ ε_i : observation error or the unobservable

- 2nd stage: $\ln(y_{t+2}) = \alpha + \beta\hat{D} + \theta\ln(y_{t-1}) + \gamma X + \delta Z + \varepsilon$
  - ✓ *y(t+2)* : business outcomes (sales and number of employed) at t+2
  - ✓ *y(t-1)* is the business outcomes in the previous year of SMTI grant
  - ✓ $\hat{D}$: estimation result of D from 1st stage model
  - ✓ *X, Z* : firm's characteristics

Results

Effectiveness of project selection

- Analysis for the recipients and non-recipients from 2005 to 2007
- Firm's technological ability is well considered, while firm's financing ability has no significant effect on the grant award (both for General and Strategic Projects)
- Firms in Seoul Metropolitan Area and Daejun have clear disadvantage in the selection of General Projects
- As expected, 'competition rate' variable has significant effect on the award

Results of 1st stage estimation (in short)

	General Projects	Strategic Projects
Firm's technological capability	+++	++
Firm's financing ability	n.s.	n.s.
Region dummy (Seoul Metropolitan Area and Daejun)	--	n.s.
'Competition Rate' variable	+++	+++

Results

Effectiveness of SMTI award

- Analysis on the business outcomes for the recipients from 2002 to 2004 after two years
- Due to data constraints (insufficient information on non-recipients), the estimation results for 2005-2007 is regarded as same for 2002-2004
- Comparison between before and after controlling the selection bias
- Sales or the number of the employed in the recipients increases significantly before control, but after control this effect disappears
- Same result for General and Strategic Projects

Results of 2nd stage estimation (in short) : General Projects

	Before control		After control	
	Sales	# of the employed	Sales	# of the employed
General Projects	++	n.s. (+)	n.s. (-)	n.s. (-)
Strategic Projects	n.s. (-)	++	n.s. (+)	n.s. (-)

Implications of Evaluation

Effectiveness of project selection

- Current selection process considers firm's technological capability effectively, but the financing ability is not considered : Risk of 'adverse selection'
- Disadvantage of Seoul and Daejun regions where many innovative SMEs are located has to do with the intention of SMBA to take the regional distribution into account

Effectiveness of program

- Though SMTI grant has some positive impact on the outcomes, this impact disappears after controlling selection bias
- The impact of SMTI grant on business outcomes could not verified
- Possible reasons of this results
  - ✓ High volatility of Korean SMEs to exogenous factors
  - ✓ Failure of selecting adequate SMEs
  - ✓ Lack of systematic performance management of SMTI program
  - ✓ Limitation of evaluation due to data constraints

Recommendations for the SMTI Program

Recommendations for the SMTI program

1. Aims and target of the program should be clarified
   - ✓ Focus on promoting R&D activities of the existing SMEs that have difficulties in financing the R&D cost due to market failure
2. Strategic aspect of the program should be strengthened
   - ✓ General Projects : reduction in the share of budget and increase in project cost in order to cover real R&D cost and lessen management burden
   - ✓ Strategic Projects : increase in the share of budget and utilization of technology evaluation system in the market
3. Financing ability of applying firms should be considered more explicitly
4. Regional consideration for General Projects should be abolished
   - ✓ Not the aim of SMTI program and done by other programs
5. It should set up an effective follow-up performance management system
6. Program data should be accumulated systematically for future re-evaluation of the program

Part-04 Concluding Remarks

Lessons and Challenges of IEBP

Issues being raised by the last two years' experience with IEBP

- Availability of data is the most critical component of evaluation
  - ✓ Only 20% of the evaluation studies could conduct an empirical analysis
  - ✓ Often data for evaluation do not exist or government officials have given little attention to them.
  - ✓ Data collection should be an active part of the program implementation.
- Selecting programs being evaluated proved to be a tricky process
  - ✓ Different purposes and approaches by MOSF and line ministries respectively
  - ✓ Tension between budgetary decision and improvement of program
  - ✓ The coverage of IEBP needs to be expanded
- Quality of evaluation studies varies greatly
  - ✓ KDI's management on the evaluation studies has not always been sufficient
  - ✓ Need to expand the pool of researchers and strengthen the quality control

THANK YOU

Korea's Leading Think Tank KDI