THE IMPACT OF THE KOREAN PRELIMINARY FEASIBILITY STUDY ON BUDGETARY DECISIONS

By

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ABSTRACT

In 1999, Korea adopted the Preliminary Feasibility Study (PFS) to enhance fiscal efficiency by preventing unsuitable projects from being allocated a budget in the budget selection (BS) process. The PFS uses both economic and non-economic assessment criteria. However, according to data collected since the introduction of the PFS, about 30 per cent of projects not recommended for budget allocation received a budget. This raises questions about the relationship between the PFS and budget allocation. According to previous research, three issues about the effect of the PFS on budgetary decisions caused concern: the effect of PFS results on budgetary decisions, the appropriateness of the current PFS methodology, and the potential non-neutral behaviour of stakeholders taking part in the PFS. To deal with these, the thesis uses three key research questions: What is the impact of PFS results on budgetary decisions? Does the current PFS methodology lead to inappropriate decisions? And, lastly, what are the types of, extent of, and reasons for non-neutral behaviour by stakeholders in the PFS, and how might such behaviour be reduced? The study suggests that PFS results have a positive impact on budgetary decisions. The thesis also examines the appropriateness of the current PFS methodology and provides potential alternatives through both quantitative and qualitative analysis. Lastly, the thesis provides evidence of non-neutral behaviours by stakeholders in the PFS, which are categorized into four types: Promoter, Blocker, Dr. Pangloss, and Cassandra type. After this, this thesis examines the reasons for non-neutral behaviour and suggests possible policy alternatives for reducing non-neutral behaviour.

DEDICATION

I WOULD LIKE TO DEDICATE MY THESIS TO THE GOD

WHO ALWAYS LOVE ME

AND

I WOULD LIKE TO DEDICATE MY THESIS TO MY BELOVED FAMILY

TO MY DEVOTED WIFE, YUN-JUNG LEE

WHO IS THE LIGHT OF MY LIFE AND GAVE ME HER WHOLEHEARTED

SUPPORT DURING MY LONG STUDY JOURNEY

TO MY SON, SANG-HO, AND DAUGHTER, SU-HYUN

WHO HAVE BEEN A GREAT SOURCE OF PLEASURE AND MOTIVATION

TO MY PARENTS, PIL-NAM DO AND THE LATE HUN-HAK LEE

WHO GAVE ME LIFE AND ENDURING LOVE

TO MY PARENTS-IN-LAW, JONG-JU YOOK

AND THE LATE YOUNG-MIN LEE

WHO GAVE ME THE MOST SPECIAL PERSON IN MY LIFE

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LIST OF ABBREVIATIONS

BAI	Board of Audit and Inspection of Korea
GAO	United States Government Accountability Office
KDI	Korean Development Institute
MBO	Management by Objectives
MOSF	Ministry of Strategy and Finance
OECD	Organisation for Economic Co-operation and Development
OMB	Office of Management and Budget
PART	Program Assessment Rating Tool
SABP	Self-Assessment of Budgetary Programmes
PFS	Preliminary Feasibility Study
PRP	Preliminary Project Recommendation Process (This is used as a substitute for the PFS after Chapter 3)
AHP	Analytic Hierarchy Process
RBS	Recommendation for Budget Selection
Recommended	Recommended as candidate for positive BS by policy analysts
Not- recommended	Not-recommended as candidate for positive BS by policy analysts
BS	Budget Selection on new projects
Selection	Budget approval on new projects by the MOSF
Selected	Selected as a new project to be given budget approval by the MOSF
Rejected	Rejected as a new project to be given budget approval by the MOSF
BP	Budget Pace

	(the annual rate at which the budget for a project is released)
SIZE	Project size in the context of central government expenditure
SHARE	Whether or not the total project cost is shared between central government and others
TRANS	Whether or not a project is a transportation project
MINISTRY	Whether or not a project is promoted by a ministry
CAPITAL	Whether or not a project concerns the capital area (the area in which the capital city is located)
RELATED	Whether or not a project is related to another project
RULING	Whether or not a project is promoted by the ruling party
MAJOR	Whether or not a project is a major government project

CHAPTER 1 INTRODUCTION

1.1. Background

Public investment decisions are not only political decisions; emerging from a number of political exchanges, they are also economic decisions, because they are subject to budget constraints (Brown and Jackson. 1986). In 1999, Korea adopted the Preliminary Feasibility Study (hereafter the PFS) to enhance fiscal efficiency by preventing non-feasible projects from getting approval for their budgets. The PFS seeks to provide better decisions by using both economic and non-economic assessment criteria. However, according to data collected since the introduction of the PFS, about 30 per cent of non-feasible projects have received a budget (Ko, 2007). This statistic raises questions about the relationship between the Analytic Hierarchy Process (AHP) score, which has been produced as part of the PFS, and budget allocation; and it also represents a result that is contrary to the aim of the PFS. Thus, an investigation of the impact of the PFS on budget allocation is very important for public investment.

According to previous research, there are three issues about the effect of the PFS on budgetary decisions that cause concern. The first issue is about the effect of PFS results on budgetary decisions, and the role played in the results by policy information. In contrast to previous research, which has argued that policy information has only a passive and supportive role to play in the production of budget decisions (Weiss 1980, Lindblom 1986, Shulock 1999, Dunn 2003, Kirp 2004), Ko (2007) argues that the results of the Korean PFS play an important role in preventing non-feasible projects

from receiving budgets. Looking again at previous research, we find that there are several factors which affect budgetary decisions: budget constraint-related ones, project-related ones, and policy/politics-related ones (Melkers and Willoughby 2001, GAO 2004, Gilmour and Lewis 2006, Bang 2009). For these reasons, a study of the effects of PFS results on budget selection decisions (hereafter BS decisions) and budget pace[1] decisions (hereafter BP decisions), with the investigation of various control variables, is important in exploring the role of the PFS.

The second issue is about the appropriateness of the current PFS methodology. PFS results – the AHP score and recommendation for budget selection decision (hereafter the RBS decision) are produced through the combination of a scoring methodology and a weighting methodology. The current scoring methodology uses a nine-point scale; and the current weighting methodology is based on policy analysts setting different weightings for each project that is assessed (KDI 2008). According to previous research, there are several arguments about the appropriateness of the nine-point scale methodology and weighting methodology for the PFS. On the scoring methodology, there is concern about the discretization of ratios on the nine-point scale, which is used as tool for changing verbal judgments into numerical priorities for appraisal sub-factors (Salo and Hämäläinen 1997). Furthermore Kwon (2007) argues that using the nine-point scale for changing the B/C ratio into an economic priority may exaggerate the effect on the AHP score of this ratio when it is around B/C = 1. On the other hand, with respect to the weighting methodology, some researchers have argued that composite

[1] **Pace**: the annual rate at which the budget for a project is released by the MOSF. A detailed explanation will be given in Chapter 5

indicators are sensitive to aggregation methods, thus changing the weighting rules can substantially influence the result of composite indicators (Jacobs and Goddard 2007). Furthermore, as policy analysts in the Korean PFS have discretionary power in setting weightings on appraisal sub-factors, within the range permitted by guidelines, it may be supposed that policy analysts play an important role in the determination of PFS results (AHP scores and RBS decisions). With respect to this discretionary power of policy analysts, some researchers have raised the issue of subjective decisions and opportunistic behaviour by policy analysts (Meltsner 1976, Weimer and Vining 2005). Considering the effect of PFS results (AHP score, RBS decision) on the budget allocations (BS, BP) of large scale projects, the appropriateness of using current PFS methodology will need to be analyzed in this study.

The third issue on which the present research focuses concerns the potential non-neutral behaviour of stakeholders who take part in the PFS process and the reasons for such non-neutral behaviour. As PFS methodology is currently designed, the PFS results are highly sensitive within a critical range of B/C ratios and the weightings which are set on appraisal sub-factors. Consequently, PFS results are likely to be sensitive to the behaviour of the policy analysts who appraise a project, through their scoring and weighting of appraisal sub-factors, and the behaviour of other stakeholders whose actions may affect the policy analysts' decisions on scoring and weighting. For these reason, the behaviour of each stakeholder will need be explored in order to analyze the effect of the PFS on budget allocation for large-scale projects. As for the behaviour of policy analysts, in contrast to the view of policy analysts as technocratic and value-neutral experts, many previous researchers have pointed out that policy analysts bring to

policy analysis their own diverse value chains. Meltsner (1976) argues that as policy analysts have their own diverse objective functions and different levels of technical expertise, their value-neutral image is a misperception. Weimer and Vining (2005) state that although keeping analytical integrity is important in some dimensions, in the real world there exist policy analysts who clearly advocate on behalf of a client or of their own views on an issue. On the other hand, the other stakeholders, especially government officials, can be thought to serve not only their political master, but also their self-interests (Brown, Jackson et al. 1986). Furthermore, the PFS process can be distorted by political and bureaucratic lenses (Boardman, Greenberg et al. 2010). Consequently, it is important to explore the behaviour of each stakeholder in order to explain their effect on PFS results. Of course, although there will always be some room for the judgment of each stakeholder, and their goals and values (Meltsner 1976, Weimer and Vining 2005), where the role of the judgment of each stakeholder grows too large, where their judgments are too influenced by their subjective views, and where opportunistic decision-making takes place, the exercise of such judgment may undermine trust in the appraisal process and may cause inefficiency in budget allocation resulting from the PFS (Ko 2007). In order to reduce this opportunistic decision-making, it is important to recognise that the behaviour of stakeholders can be affected by framework in which they work (Brown, Jackson et al. 1986). In this study, the relationship among the stakeholders in the PFS may be defined as one of multiple tiers or multiple agents and multiple principals (Dixit 2002). Furthermore, the reasons for each policy analysts' non-neutral behaviour can be explored by looking at the goal conflicts and information levels related to each stakeholder (Waterman and Meier 1998).

1.2. Research objectives and research questions

From the background of this study given above, we can identify the following research objectives:

- To explain the impact of PFS results on budgetary decisions
- To examine the appropriateness of using current PFS methodology to produce PFS results
- To suggest possible policy alternatives to current PFS methodology
- To examine the types of, extent of, and reasons for non-neutral behaviour by stakeholders in the PFS process
- To suggest policy alternative for reducing these non-neutral behaviours.

These research objectives will be addressed through the following three main research questions and one preliminary research question.

1) ***Preliminary research question:***

How does the PFS and related budget process operate?

This is the preliminary research question for examining the current PFS system and raising the issues which will be dealt with in the main research questions. As there may be differences between the PFS as defined by law (or regulations) and the PFS in practice, the research sub-questions for approaching this preliminary research question can be divided roughly into two: ① what is the PFS system as defined by law and

regulations? and ② does the system actually follow the law and regulations to the letter? Furthermore, as this study is about the relationship between the PFS and budgetary decisions, the system which will be analyzed can be also divided into the PFS and the related budgetary decision-making. For these reason, the detailed research sub-questions can be divided into four, as follows.

- What is the Korean PFS?
- What are the requirements for new projects to receive a positive BS (budget selection) and for ongoing projects to have their BP (budget pace) set?
- How do the scoring and weighting methodologies work, in combination with other practices and factors, to determine PFS results?
- Do these systems actually follow the law and regulations to the letter?

2) Research Question 1

What is the impact of the PFS results on BS and BP decisions (controlling for other factors)?

This research question examines the relationship between the results of PFS (AHP score and RBS decision) and budgetary decisions (BS or BP decision). In order to pursue an in-depth study of the effect of PFS results on these budget decisions through a comprehensive analysis of related factors, it is necessary to explore the overall set of influences on budget decisions as well, because budgetary decisions on large-scale projects may be influenced by not only PFS results but also by other factors (examined in the preliminary analysis). The research sub-questions can therefore be divided into three as follows.

- What is the impact of PFS results on BS decisions?
- What is the impact of PFS results on BP decisions?
- How do other factors influence BS and BP decisions?

3) ***Research Question 2***

Does the current PFS methodology lead to inappropriate decisions, from the perspective of different stakeholders, on the set of projects which are recommended for selection?

This research question is about the impact of current PFS methodology on RBS decisions. Although PFS results can be divided into two – AHP score and RBS decision – in this study, RBS decisions will be the main object of analysis as dependent variables, because, according to the law and regulations on budgeting for large-sale projects, only an RBS decision which has been determined by an AHP score is an essential requirements for the BS decision, while an AHP score itself is not included in the requirements for budgetary decisions.

As PFS results are produced by multiplying the scores and weightings set for the appraisal sub-factors, it is necessary first to analyze the effect of the current PFS methodology (scoring and weighting methodology) on RBS decisions. After this, as each scoring and weighting methodology has its strong and weak points, the analysis requires exploration of the views of stakeholders who have taken part in the PFS about the scoring and weighting approaches in the current PFS methodology. Lastly, possible policy alternatives need to be compared with each other in terms of their likely effect on RBS decisions. Therefore, in order to explore this research question, the following research sub-questions need to be answered.

- What are the effects of the current PFS methodology on RBS decisions?
- What are the views of stakeholders in the PFS process on whether the current PFS methodology leads to appropriate RBS – and what are the reasons for these views?
- What would be the effect of possible alternative PFS methodologies on RBS decisions?
- How desirable do different stakeholders think these alternative PFS methodologies would be?

4) ***Research Question 3***

: What are the types of, extent of, and reasons for, non-neutral behaviour by stakeholders in the PFS, and how might this behaviour be reduced?

This research question is about the non-neutral behaviours of stakeholders in the PFS and the reasons for these. We have divided stakeholders into three types: spenders (local government officials, agents and line-ministry officials), policy analysts (KDI analysts, professors and private company analysts), and MOSF officials according to the PFS guideline. We have also divided the non-neutral behaviours of each stakeholder into four categories, according to their intentionality and the direction of their tendency. In order to explore the reasons for these non-neutral behaviours, we have divided the relationship among the stakeholders into eight types, which are based on goal conflict and information asymmetry among stakeholders in the multiple-tier multiple-principal multiple-agent models. In order to explore this research question, the following sub-research questions need to be answered.

- What are the types of and extent of non-neutral behaviour by stakeholders that occur in the PFS?
- What are the reasons for the observed non-neutral behaviour by stakeholders in the PFS?
- How might those types of non-neutral behaviour which are not desired by the MOSF be reduced?

1.3. The scope of the research

This thesis will discuss the impact of the PFS on budgetary decisions through addressing three main research questions (see previous section). As two main research questions are about the impact of PFS results on budgetary decisions and the impact of PFS methodology on PFS results, respectively, the empirical analysis will be use secondary analysis of the results of the PFS on the budgetary system in Korea. The third research question is about the non-neutral behaviour of analysts who have taken part in the PFS and policy decision-making processes, so empirical analysis here uses both primary and secondary data about the decisions of analysts within the PFS system in Korea. This leads to the creation of some feasible policy alternatives which reflect the Korean context. In sum, this thesis provides the first empirical research on these research questions using Korean PFS data.

There are two types of data analysed in this thesis: quantitative and qualitative. Analysis of the quantitative data is used to explain both the effect of PFS results on budgetary decisions and the effect of current PFS methodology on PFS results, and to give some useful implications for policy alternatives. Analysis of the qualitative data is used to

explore the types of, extent of, and reasons for, various non-neutral behaviours by stakeholders in the PFS, and feasible policy alternatives. For the quantitative data, 450 sets of PFS results which were released by the KDI between the years 1999 and 2010, as well as the related annual budget allocation data, are used. These PFS results include each project's AHP score, sub-appraisal factor scores (economic, policy, and regional factor) and weighting of sub-appraisal factors. However, each policy analyst's individual scores and weightings for each project are not used, because the KDI does not make these public. As for the annual budget allocation data, this includes the final annual budget for each project which was finalized by the National Assembly. For the qualitative data, documents, archival data, and two sets of in-depth interviews with stakeholders and experts who had experience of taking part in the PFS, are used. Forty two interviewees were chosen, and these were people who had taken part in the PFS for certain projects which were identified through the analysis for Research Question 2-1 (What are the effects of the current PFS methodology on RBS decisions?) - specifically, they had worked as analysts on projects for which the RBS decision would change if the weightings set for them were to be changed to the average value for the permitted range given in the PFS guidelines.

1.4. The structure of the thesis

The organization of this thesis can be seen in Figure 1-1. The following is a brief overview of this structure.

Chapter 1 has introduced the background, aims, research questions, and scope of this research, and the way it is organized.

Chapter 2 explores previous research for this study area. The previous research into decisions on budget allocation and the role of policy information in the decision-making process are introduced in order to analyze the impact of PFS results on budgetary decisions. After that, theories about AHP scoring and weighting methodology are introduced in order to investigate current PFS methodology. Thirdly, theories about the behaviour of stakeholders are explored in order to analyze the non-neutral behaviours which affect PFS results. Lastly, multiple-tier and multiple-principal multiple-agent theories are explored to draw out policy implications for reducing the non-neutral behaviour of stakeholders in the PFS.

Chapter 3 provides an overview and preliminary analysis of the current Preliminary Feasibility Study and budget allocation process in South Korea. This chapter provides answers to the two preliminary research questions (① What is the system, as defined by the law and regulations? and ② Does the system actually follow the law and regulations to the letter?) in order to diagnose the current system and raise issues related to the main research questions, which occur later in the thesis (Chapter 4) and which are discussed in detail in Chapters 5, 6, and 7.

Chapter 4 explores the design, processes and methodological issues of this study. It is composed of four parts, including the development of the research questions and a methodological framework, and provides grounds for mixed approach. After that both the quantitative and qualitative approach of the research for each research question are explained in detail.

Chapter 5 provides the empirical analysis and results needed to pursue Research Question 1 (What is the impact of the PFS on BS and BP decisions?). As this question has two quantitative sub-questions, a quantitative approach is adopted. The first research question, which is about the relationship between RBS and BS decisions, is addressed using a multiple binary logistic regression model which includes one independent and six control variables (cross-sectional studies). The second research question, which is about the relationship between AHP scores and BP decisions, is addressed using a multiple regression model, which also include one independent and six control variables (longitudinal studies).

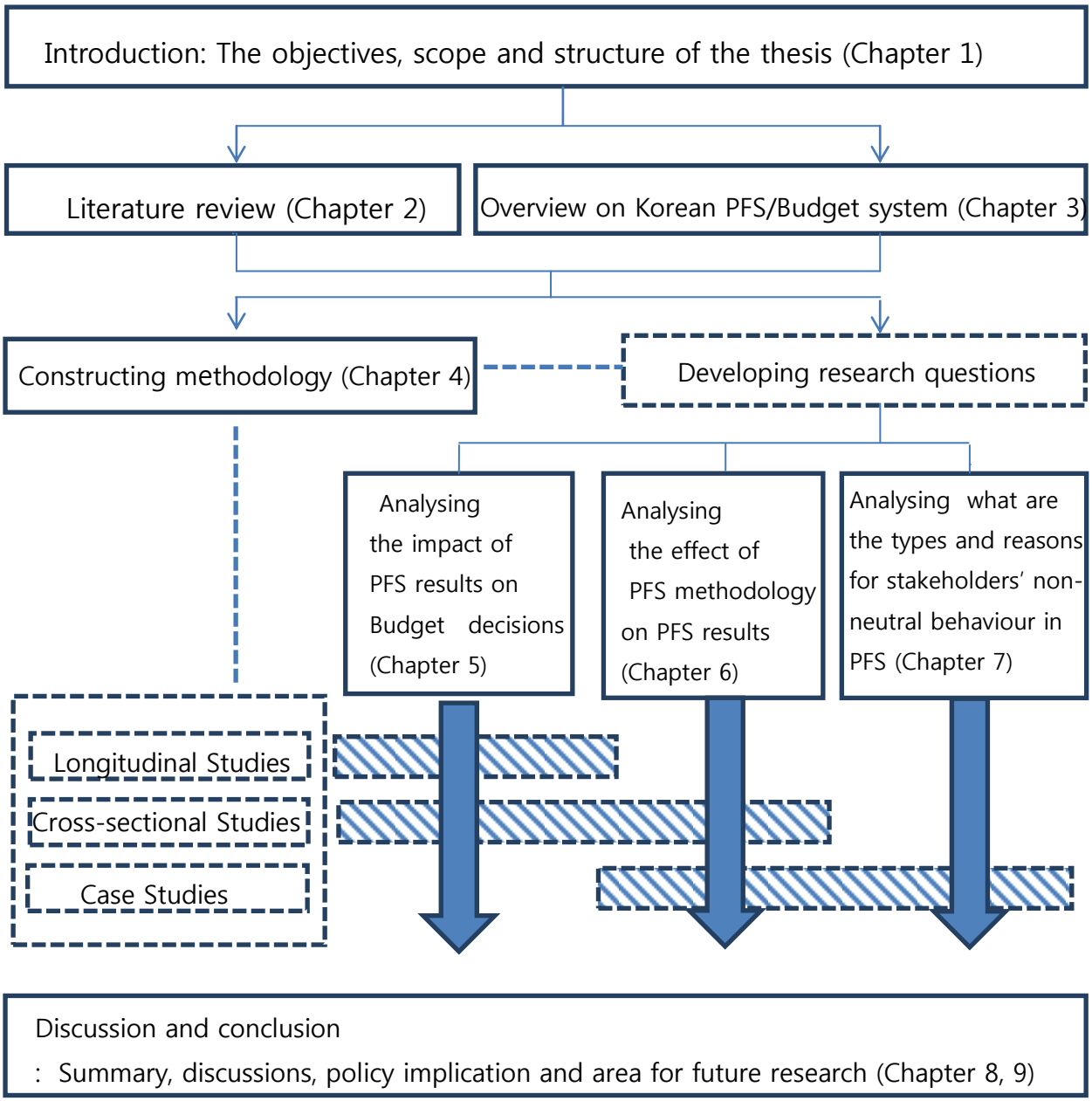
Chapter 6 provides the empirical analysis and its results for Research Question 2 (Does the current PFS methodology lead to inappropriate decisions, from the perspective of different stakeholders, in the set of projects which are recommended for budget selection?). As there are two qualitative and two quantitative research sub-questions, both approaches are adopted in this chapter (cross-sectional studies for quantitative research sub-questions, case study for the two quantitative research sub-questions).

Chapter 7 provides the empirical analysis and its results for Research Question 3 (What are the types of, extent of, and reasons for, non-neutral behaviour by stakeholders in the PFS, and how might they be reduced?). This chapter explores the existence of, extent of, and reasons for, non-neutral behaviour by stakeholders in the PFS. Also, it suggests policy implications for improving the PFS. As the three sub-questions for addressing this research question are all qualitative, a qualitative approach (case study) is adopted.

Chapter 8 discusses issues which are raised by the analyses and confirms the findings of the thesis. It interprets the findings and issues that emerged from the analyses for each research question, and suggests feasible policy alternatives for the current PFS methodology and for reducing non-neutral behaviour by stakeholders. It also discusses the contribution of this thesis to knowledge and to the work of policy makers.

Chapter 9 addresses the research questions, summarizing the main findings of the study, and considers the limitations of the research and the possibilities for future study.

Figure 1-1: Structure of the thesis



CHAPTER 2 LITERATURE REVIEW: APPRAISAL TECHNIQUES, FEASIBILITY STUDIES AND BUDGET ALLOCATION PROCESSES

2.1. Introduction

Chapter 2 provides a review of the literature dealing with appraisal techniques similar to the Preliminary Feasibility Study (here after PFS) and the ways in which they relate to the budget allocation process.

This chapter is composed of three sections. The first deals with the literature on the effects of policy information on the decision-making process and on the factors which affect budgetary decisions. In particular, we review previous research on the effect of performance indicators on budgetary decisions. This research is important for the analysis of the effect of PFS results on budgetary decisions, because literature directly dealing with that specific issue is very difficult to find. Second, in the second section, we review the literature on the appropriateness of the current PFS scale and weighting methodologies. Several alternatives to the nine-point scale methodology are considered and compared with that methodology. Furthermore, we consider several previous research studies into the sensitivity of composite indicators for project rankings. Lastly, we review the literature on the existence of, and reasons for, non-neutral behaviour by stakeholders who take part in the appraisal process.

2.2. Theories related to the effects of PFS results on budgetary decisions

In this section, we review theories which are related to the analysis of the effects of PFS results on government budgetary decisions. In order to explore these theories, the character of PFS has to be examined in advance. Our review demonstrates that there has been little previous research on the form of policy analysis which PFS represents, and on the effects on budgets of procedures such as PFS. However, some related theories can be found, and these are divided into two; ① theories about the effects of the judgment of policy analysts in decision making, and ② theories about how performance results and other factors affect budgeting decisions.

2.2.1. The character of PFS

In this section we outline why PFS can be characterized as a prospective form of policy analysis.

PFS as policy analysis

There are a lot of definitions of policy analysis. Williams (1971) defines policy analysis as 'the means of synthesizing information including research results to produce a format for policy decisions (the laying out of alternative choices) and of determining future need for policy relevant information'. In the same vein, according to Dunn (2003), policy analysis can be defined as 'an applied social science discipline which uses multiple methods of inquiry and argument to produce and transform policy-relevant information that may be utilized in political settings to resolve policy problems'. On the

other hand, in contrast to these definitions, which lack a client-orientation, some researchers argue that policy analysis can be defined as client-oriented advice which is relevant to public decisions and informed by social values (Beckman 1977, Weimer and Vining 2005).

PFS can be defined as an overview which is aimed at making it possible for budgetary decisions to be better informed (KDI 2012). Consequently, taking into consideration these previous approaches to the definition of policy analysis, and the definition of PFS, this study considers that PFS can be defined as policy analysis and, more specifically, as client-oriented advice to policy makers.

PFS as prospective policy analysis

Policy analysis can be further classified as descriptive policy analysis or prospective policy analysis, according to its aim and the way in which it is conducted (Tong 1986, Patton and Sawicki 1993, Dunn 2003).

Descriptive policy analysis is the historical analysis of past policies or the evaluation of a new policy that is being implemented. Descriptive policy analysis can be divided into retrospective and evaluative categories. Retrospective analysis is the description and interpretation of past policies (What happened?), while evaluative policy analysis consists of program evaluation (Were the purposes of the policy met?) (Patton and Sawicki 1993).

On the other hand, prospective policy analysis is policy analysis which focuses on the possible outcomes of proposed policies (Tong 1986, Patton and Sawicki 1993). Prospective policy analysis can be divided into two types: predictive and prescriptive, with predictive analysis referring to the projection of future states resulting from adopting certain alternatives, and prescriptive analysis referring to analysis which recommends actions because they can be expected to bring about particular results (Patton and Sawicki 1993, Dunn 2003). Prospective analysis is characterized as exploring the political feasibility of alternative policies and the systematic assessment of the technical and economic acceptability of the expected outcomes of policy adoption. The core process in prospective policy analysis is the identification and verification of a complex problem, the quantitative and qualitative analysis of alternative policies that might redress that problem, and the development of this information into an outline which policy makers can use when they make a decision (Patton and Sawicki 1993). This thesis takes the position that PFS is a form of prospective policy analysis, because it focuses on predictive analysis, analyzing a projection of future states which will result from the adoption by government of certain projects.

2.2.2. The effects of the judgments of policy analysts on decision making

PFS results emerge from the judgments of policy analysts through the policy analysis process. The PFS results (specifically, the AHP score and RBS decision, as discussed later) can be characterized as the expression of policy analysts' preference for projects which are then presented to decision makers. For this reason, an understanding of the impact of PFS results on budget decisions requires consideration of the literature on the effects of the judgment of policy analysts on the decision-making process.

Although many authors suggest that the main purpose of policy analysis is to improve policy making or to have an impact on policy making, some researchers argue that the impact of policy analysis may be limited, because most policy changes are gradual, disjointed, and incremental (Dunn 2003). Thus, in this section, we examine competing theories about the impact of policy analysis on policy decisions generally, and about the impact of PFS results on budgetary decisions in South Korea in particular.

The limited role of policy analysts' judgments: the traditional view

Shulock (1999) explains that, in the traditional view of policy analysis, the role of policy analysts who have been trained in proper analytical techniques can be presumed to be as follows. Firstly, they can apply their analytical techniques systematically to the political marketplace. Secondly, they can discover and measure the impact of policies on clients' interests, and can estimate policy consequences. Lastly, they can affect the decisions of their clients, who will use the results of analysis to deal with policy problems. This is an optimistic view that shows the positivism of the social sciences. These roles of policy analysis are implemented well in the policy-making stages, of which one of the final ones is the giving of timely advice to a client. This client orientation view emerges naturally from the view of policy making as relatively orderly, and may contrast with today's view of policy making as having an emphasis on the more dynamic aspects of the process. In this view, policy analysis is taken to be a recommendation to a client, rather than the formulation of a broader political discourse, and its usefulness is dependent on its effect on eventual decisions or actions by policymakers.

However, some authors suggest that this is a misguided view of policy analysis, because, in practice, the results of policy analysis have been selected, distorted or neglected according to the political interests of decision-makers during the political decision-making process (Lindblom 1986, Shulock 1999, Kirp 2004). Lindblom (1986) argues that policy analysis is a limited tool, which is just one of several routes to social problem solving. He also argues that policy analysis may be characterized by features such as poorly conceived dependence on science and an inappropriate attempt to adopt comprehensive rationality within a process which is, in practice, incremental. From this perspective, policy analysis is likely to have a very limited effect on policy making.

Enlightenment role of the judgment of policy analysts: an interpretive view

Some authors have suggested an alternative view of policy analysis with a different theoretical bent, leading to a very different concept of the 'use' of the process. This view suggests neither an insignificant nor an illegitimate use of policy analysis, even though these different uses are not what policy analysts might look for (Weiss 1980, Dunn 1997, Shulock 1999, Dunn 2003).

According to Weiss (1980), policy analysis seems to have had a pervasive effect by purporting to structure people's understanding of social reality. Policy analysts claim to provide a basic set of ideas – models of the interactions of people, conditions and events – which can form our images of how the world works. Weiss call this use of policy analysis an indirect kind of 'knowledge creep' and argues that the people in his study emphasized this kind of knowledge creep.

Shulock (1999) argues that according to several empirical research studies in the US, investment in policy analysis is increasing, whilst the use of policy analysis is decreasing, which seems at first glance to be a paradox. However, it is important to recognize that the use of policy analysis might expand appreciably if policymakers, including other users of policy analysis and analysts themselves, began to produce policy analysis more accurately, not as a comprehensive, problem-solving tool, but simply to serve informed discourse. Shulock proposes that policy analysis is used in the following three ways, which are different from the traditional view (Shulock 1999:229),

① *policy analysis is used as language for framing political discourse*

② *policy analysis is used as legitimate rationalization for legislative action where prospective rationality is inhibited by 'garbage can' decision environments*

③ *policy analysis is also used as a symbol of legitimate decision-making processes that can increase support for governance processes in a society that values rationality.*

If we consider these uses of policy analysis, even with the limitations which are recognized by the traditional view, policy analysis could have a major impact on policy (Shulock, 1999).

In the same vein, Dunn (2003) suggests that, in principle, policy analysis has the potential for creating better policies through problem structuring, forecasting, recommendation, monitoring and evaluation. Even though policy analysis has a relatively marginal influence, rather than causing large and discontinuous changes to policy, these potential uses of policy analysis can improve policy making.

Table 2-1: Premises of policy analysis: traditional versus interpretive view

	Traditional view	Interpretive view
Decision making	▪ rational choice: decision-makers set goals and maximize utility by choosing best means ▪ prospective rationality ▪ problem can be solved by systematic thinking	▪ ambiguous goals, uncertain means ▪ decisions primarily about process and organizational legitimacy ▪ retrospective rationality
Policy analysis (Information)	▪ objective, ideally conclusive ▪ useful problem-solving method ▪ reduces uncertainty about the relationship between policies and outcomes ▪ used by clients or decision-makers to make choices among alternatives	▪ inherently inconclusive ▪ means of democratic process ▪ reflects value and personal status ▪ information frames understanding of problems ▪ used by policymakers and citizens to structure problem, forecast expected policy outcome, and provide information about adopting policy's consequence
Policy process	▪ linear, stages, ▪ decision-makers and experts ▪ monopoly jurisdictions ▪ incremental change	▪ nonlinear ▪ constant battle over agenda ▪ competition over jurisdiction and issue interpretations ▪ dynamic change
Use of analysis in practice	*Limited role in making decisions* ▪ policy analysis is a limited tool for social problem-solving (Lindblom 1986) ▪ policy analysis cannot fulfill the role of objective policy analysis (Kirp 2004) ▪ value of objectivity in policy analysis falls quickly (Davies 1998)	*Enlightenment role* ▪ policy analysis might have general effects on policy (Weiss (1980) ▪ policy analysis has the potential for creating better policies (Dunn 2003) ▪ use is indirect, delayed and general (Dunn 2003) ▪ policy analysis contributes to informed discourse and idea generation (Shulock 1999)

Source: Adapted from Shulock (1999), (Weiss (1980), Lindblom (1986), Davies (1998), Dunn (2003), Kirp (2004))

Role of PFS results in budgetary decisions in South Korea

Although previous research studies argue for a limited, passive and supportive use of policy information (Weiss 1980, Lindblom 1986, Dunn 1997, Kirp 2004), it is important to recognize that large-scale projects undertaken by the Korean government have to be subjected to the PFS process, according to the Public Finance Act and the PFS guidelines laid down in Korea. Thus the effect of PFS results on budget allocation decisions might be different from that of other types of policy information.

According to Ko (2007), 78 out of 153 projects which were subjected to PFS between 1999 and 2003 were appraised as 'not-recommended' according to their PFS results. Only 24 out of 78 'not-recommended' projects got BS through the budget process. Consequently, 70 per cent of projects which were appraised as 'not-recommended' failed to get BS, in line with the judgment of the policy analysts in the RBS decisions on these projects. Furthermore, 30 per cent of projects which got BS despite the PFS results produced by policy analysts were inspected by the Board of Audit and Inspection and were criticized by the National Assembly. For these reasons, in the Korean PFS process, policy analysis does appear to play an important role in decisions on BS in large-scale projects.

This research therefore questions previous research by suggesting that policy analysis can have direct effects on decision making. However, this research has limitations, particularly as it did not apply any tests for statistical verification.

2.2.3. The factors which affect budgeting

There have, unfortunately, been almost no previous empirical studies focusing on the effect of PFS results on budgetary decisions. However, there have been several previous studies of the effect of performance results on budgetary decisions. Although performance results are different from PFS results, in particular because they are produced by spending ministries, not by policy analysts, and because they offer an after-the-event evaluation, not a before-the-event appraisal, it is important to recognize that they can provide this study with some 'objective' indicators and some control variables, capturing other factors which might affect budgetary decisions.

Thus, this section presents factors which generate performance results that have been suggested by previous research to have an effect on budgetary decisions. These factors will then be included as control variables in our model for analysis of the impact of PFS results on budgetary decisions. Furthermore, budget management can be defined as a process for enhancing political and economic rationality through allocation of limited resources to diverse functions according to their priority (Pollitt 1999). Thus, budgetary decisions on public projects should be affected not only by PFS results but also by other factors, such as economic, policy and administrative priorities (Pollitt 1999, Perrin 2002, Curristine 2005). For this reason, in this section, I will also consider a range of other factors which have been used as control variables in previous research, classifying these variables into sub-categories in line with Jung (2012): fiscal constraint factors, project character factors and political/organization factors.

There have been several previous research studies on the effect of performance results on budgetary decisions. These studies have also included the effect of other factors as control variables on budgetary decisions. Most previous research has argued that performance results have had positive effects on budgetary decisions, and that some other factors have also had an effect on budgetary decisions.

1) US studies

Melkers and Willoughby (2001) found that performance results played an important role in budgeting. According to their survey, 39 per cent of budget officers responded that performance results played an important role in budgeting. In a similar vein, according to GAO (2001), 43 per cent of respondents replied that performance results had an impact on budgetary decisions.

GAO (2004) examined the extent to which Program Assessment Rating Tool (PART)[2] assessments have influenced allocations in the US President's budget. According to their regression analysis, the overall PART scores had a positive and statistically significant effect on discretionary program funding between the fiscal years 2003 and 2004 (measured by percentage change). GAO also examined the effect of program size on their results. According to their regression analysis, a statistically significant effect of the overall score on budgetary decisions exists only for smaller programs. However,

[2] The PART (Program Assessment Ratings Tool) is a method of evaluation and performance management the use of which is the responsibility of the OMB (Office of Management and Budget). The US has implemented the PART since the fiscal year 2003 (Breul, 2007, p.22). The PART can provide performance information appropriate to the federal programs' budget decision-making process; and according to the PART results of a program, the budget is redistributed from ineffective to effective projects.

in their analysis, the PART score only explained about 15 per cent of the variance in proposed budget changes. Therefore, they suggested that there are several institutional factors, program specifics and other unquantifiable factors which can affect proposed budget changes (Shin, 2013).

Gilmour and Lewis (2006) investigated the impact of PART scores on the recommendations in the President's budget through a regression analysis of data from the FY 2005 budget, with several control variables for the political contents of programs. They adopted the PART scores as independent variable and percentage budget changes proposed in the FY 2005 budget as dependent variables respectively. They also used the department that a program belonged to, the budget change from the year before the program was assessed, and the political configuration at the time the program was created as proxy variables for the political contents of the programs. In addition to the political contents, they use a program's age and its mission as control variables. Through their regression analysis, they argued that the PART scores for individual programs had a positive effect on the percentage budget changes proposed in the FY 2005 US budget. However, according to their analysis, the political contents of programs do not have a statistically significant effect on budget changes. On the other hand, the category to which programs belong, such as research and development, capital assets, and service acquisition, and regulatory programs, can have a statistically significant effect on budget changes to some programs (Shin, 2013).

Confirmation of the Gilmour and Lewis (2006) results came from Frisco and Stalebrink (2008), who examined the 109th US Congress report and concluded that some PART

scores had affected the budget, but they could not ascertain the extent or strength of the impact of these PART scores on budgetary decisions.

Norcross and Adamson (2006), analysing FY 2007 budget decisions, concluded that the budgets of 'effective' programs (programs with high PART scores) tended to increase, while those of 'ineffective' programs tended to decrease. They found that 34 per cent of 'not demonstrated' and 18 per cent of 'ineffective' programs respectively got an increase in their budget, while a higher percentage of 'adequate', 'moderately effective', and 'effective' programs got an increase in their budget. In particular, 59 per cent of effective programs got an increase in their budget. Conversely, 42 per cent of 'effectiveness not demonstrated' programs and 79 per cent of 'ineffective' programs got a decrease in their budget, while, a lower percentage of 'adequate', 'moderately effective', and 'effective' programs got a decrease in their budget: 42, 31, and 28 per cent respectively.

2) Korean studies

When it comes to previous research by Korean researchers, most researchers have focused on the relationship between Self-Assessment of Budgetary Programmes (hereafter called SABP)[3] results and budget allocation, showing that many factors may have an impact on budgetary decision, such as program type (direct or subsidized), ministry type (ministry or agency), and budget size.

[3] Self-Assessment of Budgetary Programmes (SABP). In order to increase the relationship between projects' performance and their budget allocation, South Korea adopted SABP in 2005. SABP was implemented with two major stages: a self-assessment step for spending ministries; and the MOSF's review of the spending ministries' self-assessment results.

Park (2005, 2008) analyzed the relationship between SABP results and the rate of increase in the budget through regression analysis of the budgets for fiscal years 2005 and 2006. He used the rate of increase of the previous year's budget, the program type, and the size of the ministry budget as control variables. According to his analysis, the SABP results for 2005 did not have an impact on the budget for fiscal year 2005, but they did have an impact on the budget for fiscal year 2006 (Park 2005, Park 2008, Shin 2013).

Bang (2009) also examined the relationship between SABP results and the rate of increase in the budget through regression analysis on the budgets for fiscal years between 2005 and 2008. He used program type and size as control variables. He argued that SABP results had a strong impact on budgeting in 2005 and 2008. However, he found that SABP results had a relatively weak impact on budgeting in 2006 and 2007, compared with of the effect they had in 2005 and 2008. On the other hand, he showed that program type had an impact on the rate of increase in the budget. According to his analysis, 'programs related to welfare' had a positive relationship with budget allocation. In the same vein, Cho (2010) also examined the relationship between SABP results and the rate of increase in the budget through regression analysis on the budgets for fiscal years between 2006 and 2008 and through a survey of the key stakeholders. He argued that SABP scores had a positive impact on the rate of increase in the budget in the three years 2006, 2007, and 2008. With respect to the control variables, he suggested that programmes related to welfare played a positive role in budget allocation through his empirical analysis. Furthermore, he found that the fact that a program was managed directly by the government had a positive impact on the budgetary decision (Shin, 2013).

Jung (2012) also found that the SABP rating had a positive impact on the rate of budget increase in his regression analysis of SABP scores against budget allocations between 2005 and 2010. According to his analysis, the assessment of programs as 'poor' had a strong negative impact on the rate of budget increase, while assessment as 'somewhat effective' had a strong positive impact, and assessment as 'effective' had a positive impact on the rate of budget increase. As for the other factors which affected budgetary decisions, he insisted that they had a different impact on the rate of budget increase according to their project-related characteristics (project size, type and character) and political characteristics (partisan, following the interests of the assembly) and fiscal characteristics (rate of budget increase in the previous year, presidential projects). According to his analysis, for fiscal factors, although the rate of budget increase the previous year had a positive effect on the rate of budget increase, the fact that projects were presidential projects had no impact on the rate of budget increase statistically. With respect to project-related factors, the SABP grade had a more positive effect on the rate of budget increase for small programs than on that for large programs, and the SABP grade also had a more positive effect on the rate of budget increase of directly managed programs than on that of indirectly managed programs. However, there was no statistical relationship either way between the SABP grade and welfare projects. Lastly, with regard to political factors, the SABP grade had a more positive effect on the rate of budget increase in the period of rule by the conservative party than in the period of rule by the democratic party.

Table 2-2: Summary of existing studies on the impact of performance on budgetary decisions

Researchers	Variable			Analysis method	Findings
	Independent	Control	Dependent		
US studies					
Melkers et al. (2001)	Score	-	Budgeting	Survey	39% of budget offices responded that performance results had a positive impact on budgeting
GAO (2001)	Score	-	Budgeting	Survey	43% of respondents replied that performance results had an impact on budgetary decisions
GAO (2004)	Score	-	Rate of budget increase	Regression (FY2003, 2004)	PART score had a positive and statistically significant effect on rate of budget increase (discretionary program and small size program)
Gilmour & Lewis (2006)	PART score	Political content of program, program age, program mission.	Percentage change in the budget from FY 2004 to FY 2005	Regression (FY 2004, 2005)	Increase in PART score by 10 points would lead to a budget increase of 4-5 % Political contents did not have statistically significant effect on budget change Some types of program had statistically significant effect on budget change
Norcross & Adamson (2006)	PART grade	-	Budgeting	Review of budget for FY 2008	The budgets of programs graded 'effective' tended to increase, whilst those of programs graded 'ineffective' tended to decrease
Frisco & Stalebrink (2008)	Part results	-	Budgeting	Review of 109th Congressional report	Some PART scores had an effect on the budget

Korean Studies					
Park (2006, 2008)	SABP score, grade	Rate of increase for previous year's budget, program type, budget and ministry size	Rate of budget increase	Regression ('06-'07)	SABP results of 2005 did not have an impact on rate of budget increase for FY 2005. SABP results had an impact on rate of budget increase for FY 2006 Some control variables had an impact on rate of budget increase
Bang (2009)	SABP score, grade	program type, size and ministry size	Rate of budget increase	Regression and Survey('05-'08)	SABP results had a strong impact on budgeting in 2005 and 2008, SABP results had a relatively weak impact on budgeting in 2006 and 2007, compared with that in 2005 and 2008. Program type had an impact on rate of budget increase
Cho (2010)	SABP score, grade	Welfare or economic related program, program size, type and ministry size	Rate of budget increase	Regression and survey('06-'08)	SABP score had a positive impact on the rate of budget increase in FYs 2006, 2007, and 2008 The fact that programs were related to welfare or were managed by the government had an effect on the rate of budget increase
Jung (2012)	SABP grade	Project-related characteristics (size, type, character) Political characteristics (partisan) Fiscal characteristics (rate of budget increase in previous year, presidential projects)	Rate of budget increase	Regression ('05-'10)	SABP grade had a positive impact on the rate of budget increase Project size, type, partisan, and rate of previous year's budget increase had an impact on the rate of budget increase

2.3. Theoretical analysis of the analytic hierarchy process

The analytic hierarchy process (AHP), which was originally proposed by Saaty, is a widely used mathematical tool in multi-criteria decision analysis (Saaty 1977, Saaty 1980, Saaty 1990). The AHP is based on a pair-wise comparison matrix and can be used to appraise the relative merits of decision alternatives through a decision hierarchy using one or several criteria. The AHP allows not only quantitative data but also the decision maker's subjective preferences and expert judgment to be used in the decision-making process. Nowadays, there are extensive practical applications of AHP (Leskinen 2000) .

Despite the wide use of the AHP, there are two issues related to AHP methodology which researchers debate. Firstly, the properties of the 1-9 ratio scale and the discretization of points on this scale (hereafter called the nine-point scale) have given rise to much debate (Salo and Hämäläinen 1997). Secondly, considering the activities that go into producing AHP scores, which are composed of multiple scores and weights, the debate among scholars about the sensitivity of the composite index to the method for producing it had better been carefully examined. Furthermore, some researchers argue that there are potential risks involved in constructing a composite index which affects the ranking of performances (Jacobs and Goddard 2007).

For these reasons, previous research related to the appropriateness of using a nine-point scale and the sensitivity of a composite index will be examined.

2.3.1. Appropriateness of the discretization of points on a nine-point scale

There are several debates about the appropriateness of using the discretization of points on a ratio scale in AHP. Let me explain the meaning of the discretization of ratio scale points in AHP. As seen from Table 2-5, according to Saaty, in the nine-point scale, priorities are measured by using a discrete and verbal pairwise comparison scale with numerical values 1/9, 1/8, …, 1/2, 1.1, 2/1, …, 8/1, 9/1. These numerical values are changed into local priorities through mapping w =1 /(scale + 1). Let me explain this mechanism through the Table 2-5: 1 (equal), 2, 3 (weak preference), 4, 5 (strong preference), 6, 7 (very strong preference), 8, 9 (extremely strong preference) measurement scale points can be change into local priorities 0.5, 0.67, 0.75, 0.80, 0.83, 0.86, 0.88, 0.89, 0.9, through mapping w = 1/(scale + 1) (Salo and Hämäläinen 1997). In this scale methodology, we can see that there is a different priority increase when each scale point is changed, which is called discretization of ratio scales. For example, the effect of replacing 1 on the scale with 2 is 17 times greater than the local priorities difference between 8 and 9 on the scale.

With respect to the appropriateness of this discretization of points on a ratio scale in AHP, Saaty argues that judgements formed and weights derived by using this nine-point scale in the subjective AHP process can be validated from his illuminated chair example (optical experiment) and the use of the inverse-square law of physics [4] which appropriately reflect the properties of subjective judgement (Holder 1990).

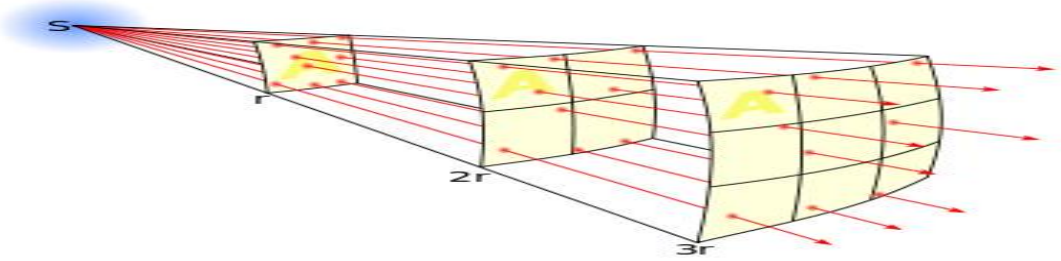
[4] inverse-square law is any physical law stating that a specific physical quantity or intensity is inversely proportional to the square of the distance from the source of that physical quantity. In equation form (Collins English Dictionary, 2003):

In Saaty's optical experiment (see Table 2-3), four identical chairs ($A_{9,}$ $B_{15,}$ $C_{21,}$ D_{28}) were placed at various distances from a floodlight (9, 15, 21, 28 yards). The people who took part in the experiment were divided into two groups: children (Group1) and adults (Group 2). The participants were placed beside the light and were asked to make pairwise comparative judgements about the relative brightness of the chairs, using a semantic scale[5].

Intensity α 1/distance^2

Let me take a physics experiment as an example of inverse-square law (see Figure). The total number of flux lines which proceed from the light source depends on the strength of the source and the increasing distance. A density of flux lines which is defined as 'lines per unit area' means strength of field. As seen from the figure, as the strength of the field is inversely proportional to the square of the distance from the source, the density of flux lines is inversely proportional to the square of the distance from the source, because the surface area of a sphere increases with the square of the radius (Wikipedia, Millerson 2013).

Figure: Inverse-square law



[5] A scale of absolute numbers (1-9) and their reciprocals is used to quantify the judgement. The prevalence is measured qualitatively using a semantic scale that links a numerical value (from 1 to 9) with a judgment expressing a possible result from the comparison (Basile, 2010).

Table: Saaty semantic scale

Aij	Judgement
1	Equal important
3	Weak importance
5	Strong importance
7	Very strong importance
9	Absolute importance
2,4,6,	Intermediate values

Through this experiment (see Table 2-3), Saaty found that illumination intensity weakens with the square of distance. According to his analysis, judgement of the relative brightness of the chairs in the optical experiment is in line with the results calculated from the inverse-square law of physics (Schmoldt, 2001, p. 150).

Table 2-3: Relative brightness estimation in optical experiment vs inverse-square law

	Relative brightness (Optical experiment)		Inverse square law
	Children	Adults	
Chair A_9	0.61	0.62	0.61
Cahir B_{15}	0.24	0.22	0.22
Chair C_{21}	0.10	0.10	0.11
Chair D_{28}	0.05	0.06	0.06

Source: From Schmoldt (2001, p. 150)

From these results, which proved that subjective optical judgements had replicated a natural law, Saaty (1996) argued that this relationship could function in the same way in the other areas of 'thought and perception'. Saaty also argued for the appropriateness of using the nine-point scale through his empirical analysis (Saaty 2008). He found that judgements on the consumption of drinks through pairwise comparison using a nine-point scale were similar to actual consumption in the US. According to his analysis of the relative consumption of drinks in the US, the priorities among the drinks were represented as relative portions and obtained from the subjective judgement of interviewees on Saaty's nine-point scale along with actual consumption (see Table 2-4).

Table 2-4: Relative consumption of drinks in the US

	Coffee	Wine	Tea	Beer	Sodas	Milk	Water
Derived priorities	0.177	0.019	0.042	0.116	0.190	0.129	0.327
Actual consumption	0.180	0.010	0.040	0.120	0.180	0.140	0.330

Harker (1987) proved that a nine-point scale does capture the human perception through his empirical analysis. In his analysis, he compared the coefficient between the estimated relative distance of each city from Philadelphia and the actual relative distances through several simple alternative scale methodologies and nine-point scale methodology. In his analysis, the nine-point scale methodology (coefficient 0.979) outperformed the alternative methodologies (coefficients 0.495-0.957).

On the other hand, some experimental studies have dealt with the problem of the nine-point scale. Lund (1986) asked participants to make pairwise comparisons on a nine-point scale for six steel cross-sections based on their elastic moment capacity. According to the study, although a verbal scale does help decision-makers create preference statements for qualitatively measurable objects, it may confuse them. Schoner and Wedley (1989), on the basis of their empirical research on comparison of ratio scales, argued that the AHP produced consistently less accurate estimates through the use of these scales. Their critique of the nine-point scale concentrated on the discretization of the scale of priority. In their experiments, subjects were judged by the proportions of colours in displays of different degrees of fuzziness. According to their experiment, the estimates of the proportions arrived at using the nine-point scale were less accurate than those obtained with other methods.

When it comes to alternatives to the nine-point scale, there are several empirical analyses which have explored these. Ma and Zheng (1991) and Salo and Hämäläinen (1997) have proposed alternatives to Saaty's nine-point measurement scale. However, it

is not clear whether these alternatives are preferable to Saaty's original proposal (Leskinen, 2000).

Salo and Hämäläinen (1997) proposed a 'balanced scale' which gave uniformly distributed priorities. Through their experiments, they found differences in different peoples' interpretations of verbal statements; and they also argued that the balanced scale was better for capturing the subjects' understanding of verbal expressions than the nine-point scale.

As seen in Table 2-5, the priorities which reflect linguistic judgements are far apart from each other, as in, 0.5 (equal preference), 0.55, 0.60 (weak preference), 0.65, 0.70 (strong preference), 0.75, 0.80 (very strong preference), 0.85, 0.9 (extremely strong preference). These priorities lead to the measurement scale, 1, 1.22, 1.50, 1.86, 2.33. 3.00, 4.00, 5.67, 9.

Ma and Zheng (1991) also presented an alternative scale with more uniformly distributed priorities than Saaty's 1-9 scale. They proposed this measurement scale, together with verbal counterparts similar to Saaty's, because they thought that the numerical values should have corresponding verbal expressions (Leskinen, 2000). However, whilst Saaty's scale is very sparse near '1', Ma and Zheng's scale is quite the opposite. Furthermore, their scale has more uniformly distributed priorities than Saaty's 1-9 scale (Salo, 1997). As seen from Table 2-5, the 9/9 (equal preference), 9/8, 9/7 (weak preference), 9/6, 9/5 (strong preference), 9/4, 9/3 (very strong preference), and 9/2, 9/1 (extremely strong preference) measurement scales lead to more uniformly distributed priorities, such as, 0.5, 0.53, 0.56, 0.60, 0.64, 0.69, 0.75, 0.82, 0.9.

Table 2-5: Alternative measurement scale methodology

Linguistic judgement	Saaty (1980)			Ma and Zheng (1991)			Salo and Hamalainen(1997)		
	scale	priority	increase	scale	priority	increase	scale	priority	increase
Extremely strong preference	9	0.9	**0.01**	9/1	0.9	**0.08**	9	0.9	**0.5**
	8	0.89	**0.01**	9/2	0.82	**0.07**	5.67	0.85	**0.5**
Very strong preference	7	0.88	**0.02**	9/3	0.75	**0.06**	4.00	0.80	**0.5**
	6	0.86	**0.03**	9/4	0.69	**0.05**	3.00	0.75	**0.5**
strong preference	5	0.83	**0.03**	9/5	0.64	**0.04**	2.33	0.70	**0.5**
	4	0.80	**0.05**	9/6	0.60	**0.04**	1.86	0.65	**0.5**
Weak preference	3	0.75	**0.08**	9/7	0.56	**0.03**	1.50	0.60	**0.5**
	2	0.67	**0.17**	9/8	0.53	**0.03**	1.22	0.55	**0.5**
Equal preference	1	0.5		9/9	0.5		1	0.5	

Source: From Saaty (1980), Ma and Zheng (1991), and Salo and Hamalainen(1997)

2.3.2. Appropriateness of using composite performance ranking indicators

Policy analysts in the PFS have discretionary power to set the weights on sub-appraisal factors within the range which is permitted by the guidelines. For this reason, projects which have the same score on sub-appraisal factors might have a different AHP score and RBS decision.

It is important to study the potential risks involved in the construction of a composite index which affects the ranking of project performance or performance results, because the use and publication of composite performance measures can generate both positive and negative behavioural responses, and many significant policy and practice decisions rely on the results of the composite index (Jacobs and Goddard 2007).

According to Jacobs and Goddard (2007), as composite indicators are sensitive to aggregation methods, changing the weighting rules can substantially influence the rankings that result from the use of these indicators. These researchers found that the construction of composite index was sensitive to methodological choice. Their empirical analysis of the data from two key public services in England – healthcare and local government – for the year 2005 found that, among 150 local authorities, the average change in ranking was between 6 and 13 when they changed the weighting on the underlying performance index. From this analysis, the key implications for policy and practice are as follows (Jacobs and Goddard 2007:109).

① Decision rules need to be treated with caution.
Subtle and highly subjective changes to the decision rules can dramatically impact on the composite index and rankings of organizations.

② The choice of a weighting system can have a significant impact on the rankings of individual units within the composite index.
The choice of weights may be ad hoc and arbitrary with lack of consideration for whose preferences the weights reflect and how robust these preferences are. Great attention should be paid to the origin and nature of weights and the sensitivity of composite indicators to changes in the weighting structure.

③ The proper treatment of uncertainty in composite performance measures is crucial.
Composite indicators need to be published with indications of the areas of uncertainty to communicate the sensitivity of the reported measure.

On the other hand, some researchers have raised the issue of the instability of rankings created by performance indicators (Goldstein, 1996, Marshall, 1998, Jackson, 2011).

Marshall and Spiegelhalter (1998) insisted that rankings produced by performance indicators were unstable. Through their analysis of 52 clinics in the United Kingdom carrying out *in vitro* fertilization over the period April 1994 to March 1995, they found that even when there were substantial differences between clinics, rankings were extremely unreliable statistical summaries of performance. These researchers carried out their analysis in the following two stages. Firstly, they picked out the 'significantly' outlying clinics, which would be identified in terms of their range of live birth rates. Of these, eight clinics had 'significantly' low live birth rates, because the total of live births for which they were responsible was below the average (14.5 per cent); and ten clinics had 'significantly' high live birth rates because the total of live births for which they were responsible was above the average (14.5%). Secondly, the researchers examined the differences in the judgments on these 18 clinics when they were ranked according to their live birth rates. According to their analysis, only one out of the eight clinics with 'significantly' low live birth rates was in the lowest quarter of rankings, and only five out of the ten clinics with 'significantly' high live birth rates were in the top quarter.

Goldstein and Spiegelhalter (1996) also argued that rankings produced by performance indicators were unstable. Through their analysis of data on 15 health boards for the year 1994, they found that in spite of individual estimates being accurate, the rankings of the boards were uncertain. According to their analysis, for which the findings were similar to those of Marshall and Spiegelhalter (1998), in terms of actual 30-day mortality rates, 13 boards had a 30-day mortality rate that was higher than the average, and no one board was below the average. However, in terms of their rankings, one board (Western Isles) was in the lowest quarter, while four health boards were in the top half.

2.4. Theories on the non-neutral behaviour of stakeholders in the policy analysis process

2.4.1. Non-neutral behaviour of stakeholders in the policy analysis process

According to the general guidelines for the implementation of the PFS process (KDI 2012), stakeholders who take part in the PFS process can be categorised into: spenders, MOSF officials, and policy analysts. The PFS process is implemented mainly by policy analysts, although the other stakeholders can also affect the PFS results through the information which they provide, through setting the guidance for the PFS process, and through managing the PFS process. As the aim of the PFS process is to enhance fiscal productivity by launching large-scale public investment projects based on transparent and objective ex-ante project evaluations, the neutrality and expertise of stakeholders is important (Ko 2007, Park 2007). However, many researchers argue that there may be non-neutral behaviour on the part of some stakeholders. For these reasons, in this section, previous research on non-neutral behaviour on the part of each stakeholder will be examined.

2.4.1.1. Non-neutral behaviour embedded in the guidance[6]

According to previous research, non-neutral behaviour that is embedded in the guidance (MOSF) can occur in two ways: ① guardians have a natural tendency to consider cost benefit analysis (hereafter CBA) as naïve and untrustworthy; ② guidance may be affected by political pressure.

[6] Guardians are often found in central budgetary agencies, such as the US Office of Management and Budget, and in controlling or co-ordinating functions within line agencies (Vining, 2001, p 18).

Guardians have a natural tendency to consider CBA as naïve

According to Boardman, Greenberg et al. (2010), guardians have a natural tendency to regard CBA as naïve and unworkable, because, they have different views on benefits and costs from those who undertake CBA. They also argue that guardians tend to distrust CBA because spenders can justify whatever they want to spend. The guardians' perspective differs from that of supporters of CBA, because their natural tendency is to focus on so-called 'revenue-expenditure', so that they tend to equate benefits with revenue coming into their agency or other government treasuries, and costs with revenue outflows from their spending agency or other government treasuries. Guardians therefore ignore non-financial social benefits and opportunity costs. Furthermore, guardians tend to distrust spenders, because, in the guardians' view, spenders have a tendency to exaggerate the CBA results through over-stating benefits and under-stating costs (Boardman, Greenberg et al. 2010).

Guardians may be affected by external political pressure

Sometimes guardians may want to pass projects which are supported by politically powerful stakeholders, e.g. the President or Congress, because the budget process is also a political process (Wildavsky 1964). Wildavsky argues that the important role of a budget bureau is to help the President carry out his purposes. Thus the bureau tends to try to get concessions from Congress for presidential projects and to push agencies to come up with new or enlarged programs which meet the President's purposes. Members of Congress sometimes try to pressurize the bureau to take account of practical politics, both in relation to their constituency interests and to their obligations as members of a

partisan interest group (i.e. their political party) in which they have to get along with their colleagues.

2.4.1.2. Non-neutral behaviour of spenders

According to previous research, the non-neutral behaviour of spenders can be divided into two: ①constituency support; ②showing their projects at their best at the PFS stage.

Constituency support

According to Boardman, Greenberg et al. (2010), spenders tend naturally to regard expenditure on constituents as a benefit rather than as a cost. For example, expenditures that create jobs are regarded as benefits for spenders, although they are a cost for guardians. In this perspective, officials do not actually consider themselves as 'spenders', but rather as 'builders' or expert deliverers of government-authorized services. This behaviour can be characterized as 'constituency-support', because spenders focus on providing projects or services to specific groups or regions in society. Since expenditure is considered a benefit, spenders generally tend to support any alternative over the status quo (Boardman, Greenberg et al. 2010).

Showing their projects at their best at the CBA stage

Flyvbjerg (2009), from his interviews with public officials, planners and consultants who had taken part in the development of large UK transportation infrastructure projects, argues that spenders are likely to present their projects at their best at the CBA stage in order to get budget approval for them. He shows that strong interests and strong

incentives exist at the project approval stage to present projects as favorably as possible – that is, with the benefits emphasized and the costs and risks underplayed. Local authorities especially stand to benefit from a project that looks favorable on paper, and they have little incentive to actively avoid bias in estimates of benefits, costs, and risks (Flyvbjerg 2009). Flyvbjerg also found that local transportation authorities knew the real costs, but they also knew that high costs reduced the chance of getting budgets for their projects. For this reason, the local transportation authorities often tried to present their projects at their best at the CBA stage.

With regard to this information asymmetry, Wildavsky and Caiden (1988) argue that spenders may decide to provide only that information which is specially requested by analysts, because no policy analyst can know everything and generally these analysts have to rely on the information volunteered by the spenders.

2.4.1.3. Non-neutral behaviour of policy analysts

Contrary to the view of the policy analyst as a technocrat and value-neutral expert, many previous researchers have argued that policy analysts engage in the policy process with their own values and cognitive bias (Meltsner 1976, MacCoun 1998, Weimer and Vining 2005, Flyvbjerg 2009).

According to Weimer and Vining (2005), there are three types of analyst – the objective technician, the client's advocate, and the issue advocate – who are categorized according to the values which each type considers paramount.

First, in the ***objective technician model***, the analyst considers analytical integrity as the basic value of policy analysis. In this view, the proper role of the analyst is to provide objective advice about the consequences of each proposed alternative. The analyst provides the client with their knowledge and analytical methodology, based on rigor. In this model, trade-offs among competing values should be left to the client, and are not for the analyst.

Second, in the ***client's advocate model***, the analyst considers his or her responsibility to the client, who may be a politician or a bureaucrat, as the prime consideration in the analysis. In this view, the proper role of the analyst is to do no harm and to promote vigorously the client's interests, as physicians or attorneys do. Here the key goal is the satisfaction of the client. Clients' advocates must put their own policy preferences in second place, behind those of their client.

Lastly, in the ***issue advocate model***, the analyst considers the analytical methodology as a way of accomplishing advocacy of a particular issue. In this view, the proper role of the analyst is to help society to progress towards the analyst's conception of a good society. If the results of analysis turn out differently from the results the analyst values in terms of policy, the analyst will change the methodology or use other data to change the results. In the same way, these analysts select their clients strategically: loyalty to one's conception of the good society should take priority over loyalty to any particular client.

On the other hand, some researchers have argued that analysts' personal prejudices and interests may influence their interpretation of scientific evidence (MacCoun 1998). MacCoun (1998) divided prototypes of biased evidence processing into four, according to analysts' intentionality, motivation and normative justifiability.

The first prototype is ***fraud,*** which is intentional, motivated effort to manipulate, conceal, or misinterpret evidence, in order to earn material rewards, to protect one's professional reputation, to advance one's theories, or to influence a political issue. There are various types and size of fraud; bribery, corruption, infringement including the theft of data, illegal insider trading and manipulating data to fraudulently achieve performance target (Jackson 2013). A second prototype is ***advocacy,*** which is intentional, motivated effort to be selective in the use of, or stress on, evidence in order to promote a favored hypothesis, although with no outright concealment or manipulation. Advocacy can be normatively defensible, provided that it occurs within a clearly advocacy-based organization. Thirdly, the prototypical ***cold bias*** is unintentional, unmotivated biased evidence processing. It is unconscious, and it occurs even when the analyst is earnestly striving for accuracy. Cold biases can be divided into two categories: psychophysical-based errors; and association-based errors. Psychophysical-based errors are due to a non-linear relationship between objective stimuli and their subjective representation; e.g. the farming effect or the anchoring effect [7] (Arkes 1991).

[7] ①Farming: using a too-narrow approach to, or description of, a situation or issue

② Anchoring or adjustment bias: having a heuristic bias which makes use of anchors. When analysts have an obvious anchor in dealing with probabilities, they can use anchoring or adjustment heuristics instead of following the normative rule of avoiding the use of anchors. In anchoring or adjustment heuristics, the anchor or reference magnitude is usually the response that lies in the middle of the response scale. Analysts who lack confidence in their judgements can play safe and select responses that lie too close to such an anchor or reference magnitude.

Association-based errors are due to automatic processes that underlie the accessibility of information in the memory (Koehler, 2008, p. 319); e.g. hindsight bias or availability heuristics[8] (Slovic and Fischhoff 1977, Kahneman, Slovic et al. 1982). Lastly, the prototypical **hot bias** is unintentional and perhaps unconscious, but it is directionally motivated. One typical hot bias is confirmation bias, which is the tendency to search for, or interpret, information in a way that confirms one's preconceptions. This is related to the concept of cognitive dissonance (Festinger 1962).

Flyvbjerg (2004) has raised the issue that *ex ante* estimates of costs and benefits are often very different from actual *ex post* costs and benefits. He has demonstrated that the consequences of large-scale infrastructure projects are cost overruns, benefit shortfalls, and the systematic underestimation of risk. According to his analysis, the average cost of overruns of large-scale projects was 20.4 per cent (road), 33.8 per cent (bridge and tunnel) and 44.7% (rail) across 20 nations.

Flyvbjerg (2004) also presented three explanations to account for cost overrun and benefit shortfalls in major infrastructure projects: technical, psychological and political-economic. Firstly, ***technical explanations*** account for cost overruns and benefit shortfalls resulting from flawed forecasting techniques, insufficient data, obvious mistakes, inherent problems in predicting the future, lack of experience on the part of

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[8] ①Hindsight bias: sometimes called the 'I–knew-it-all-along' effect, this bias is the inclination to see past events as being predictable.
② Availability fallacy: having a heuristic bias to judge frequency or probability from what is available in the memory. The availability fallacy is used when the analyst does not know the frequency or probability of instances in the outside world, and so cannot follow the normative rule of using objective measures.

the forecasters, etc. (Ascher 1979). According to this explanation, technical errors may be reduced or eliminated by better forecasting models, better data, and more experienced forecasters. ***Psychological explanations*** account for cost overruns and benefit shortfalls through so-called 'planning fallacy' and 'optimism bias' (Kahneman 1994). In the grip of planning fallacy, managers overestimate benefits and underestimate costs because they make decisions based on delusional optimism, rather than on rational assessment based on the probability of gains and losses. Over-optimism can be explained by cognitive biases which are errors in the way the mind processes information. Although the existence of optimism bias can account for the unexpected bias often found in analysis, if analysts are asked about the cause of inaccurate forecasts, they seldom give optimism bias as a main cause. ***Political-economic explanations*** consider that project planners and promoters intentionally and strategically overestimate benefits and underestimate costs when assessing the outcomes of projects. According to such approaches, planners and promoters deliberately manipulate scenarios of the future to favour the potential for success over failure. This strategic misrepresentation can be explained by principal-agency problems and by political and organizational pressures.

2.4.1.4.Summary of previous research

Previous research related to the non-neutral behaviour of stakeholders can be summarized as follows,

Table 2-6: Previous research on non-neutral behaviour

Researchers	Non-neutral behaviour			Stakeholders
	Contents	Expect character in PFS		
		Intentionality	Direction	
Boardman, Greenberg et al. (2010)	▪ ***Guardians have a natural tendency to consider CBA as naïve***	Unintended	Under-stating AHP score	Guardians (MOSF)
	▪ ***Constituency-support***	Unintended	Over-stating AHP score	Spenders
Wildavsky (1964)	▪ ***Guardians may be affected by political power***	Intended	Over-stating AHP score	Guardians (MOSF)
Wildavsky and Caiden (1988)	▪ ***Spenders may be reluctant to provide unfavorable information***	Intended	Over-stating AHP score	Spenders
Flyvbjerg (2009)	▪ ***Show their projects at their best at the PFS stage***	Intended	Over-stating AHP score	Spenders
Meltsner (1976)	▪ ***Few analysts may be value-neutral***	Intended	Unclear	Policy analysts
Weimer and Vining (2005)	▪ ***Client's advocate model***	Intended	Unclear	Policy analysts
	▪ ***Issue advocate model***	Intended	Unclear	Policy analysts
MacCoun (1998), Arkes (1991), Festinger (1962)	▪ ***Fraud***	Intended	Unclear	Policy analysts
	▪ ***Advocacy***	Intended	Unclear	Policy analysts
	▪ ***Cold bias***	Unintended	Unclear	Policy analysts
	▪ ***Hot bias***	Unintended	Unclear	Policy analysts
Flyvbjerg and COWI (2004), Ascher (1979)	▪ ***Technical explanations***	Unintended	Unclear	Policy analysts
	▪ ***Psychological explanations (optimism bias)***	Unintended	Unclear	Policy analysts
	▪***Political-economic explanations***	Intended	Unclear	Policy analysts

2.4.2. Theories of, and reasons for, non-neutral behaviour

There are several approaches to exploring the problem of non-neutral behaviour by players in a policy system. According to (Spulber 1994), these theories can be divided into four: neoclassical theories, industrial organization theories, contractual theories, and incentive theories. Neoclassical theories concentrate on the role of organizations as suppliers under conditions of perfect competition. Industrial organization theories concentrate on competition between organizations and the strategies of each organization. Contractual theories concentrate on the transaction costs of the organizations. Lastly, incentive theories concentrate on the effect of incentives on the decision process. Since the purpose of this study is to explore incentives for enhancing the quality and the role of the PFS process, so as to reduce the information asymmetry between the MOSF and line ministries, incentive theories appear to be the most appropriate ones for exploring the reason for non-neutral behaviours by stakeholders in the PFS process. Furthermore, it is important to realize that although the principal-agent theory stems from the incentive approach, its analysis extends beyond internal problems in organizations to the relationships between organizations. Thus the principal-agent theory enables us to explore the reasons for non-neutral behaviour by stakeholders in the PFS process. Since the consequences of principal-agent relationship are moral hazard[9] and adverse selection, the non-neutral behaviours might be explained by the Moral hazard and adverse selection. For these reasons, in this section, the principal-agent model, which seems appropriate for application to the PFS process, will be examined.

[9] Moral hazard arises when individuals pursue actives that will maximize their own interests at the expensive of others under the information asymmetry (Jackson, 2011)

2.4.2.1. Multiple-tier principal-agent model

Many public sector principal-agent relationships are hierarchical but with multiple tiers, where the agent at a higher tier also acts as the principal to a stakeholder at a lower tier (Dixit 2002). It is important to recognize that in Korea a PFS is expected to mitigate information asymmetry between the MOSF and line ministries and lead to better decision-making (Park, 2007). Thus the advantage of setting up such a hierarchical organization or policy system is that the intermediate tier (i.e. the KDI, policy analysts) can acquire expertise and thereby get some information which should enable it to control the lower-level agent while giving up less information in exchange than would be the case with direct supervision by a top-level principal. But this raises the possibility of collusion between the two lower tiers. Laffont (1993) offers a general insight into solving this problem. He suggests that collusion-proof schemes need to have weaker incentives at the lower tier: that is, they need to be closer to cost-plus arrangements. This is because more powerful incentives at the lower tier would mean potentially higher gain for the lower tier agent, creating greater temptation for collusion between the lower tier principal and agent, which in turn would raise the cost to the top principal of eliminating this temptation.

From this multiple-tier principal-agent model, we realized that the behaviour of some low-tier agencies might be harmful to the top-tier principals' interests, even though the existence of a mid-tier agency might be expected to play a role in mitigating the information asymmetry between the top tier and lower tier, because the two lower tiers can collude in their own harmonized interests where these contrast with the top tier's interests.

2.4.2.2. Multiple principals and agents model

In the simplest form of principal-agent relationship, agency theory assumes that social life is a series of contracts. Conventionally one member, the 'buyer' of goods or services is designated the 'principal', and the other, who provides the goods or services is the 'agent' – hence the term 'agency theory.' The principal-agent relationship is governed by a contract specifying what the agent must do and what the principal must do in return (Ross 1973, Pratt and Zeckhauser 1985). The two key elements of the principal-agent model are goal conflict and information asymmetry (Waterman, 1998). The simple principal-agent model focuses, for convenience, on one principal and one agent, highlighting the determinants of control in a dyadic relationship (Moe 1987). On the other hand, more complex principal-agent models allow for multiple principals, such as Congress, the courts and the President.

According to Waterman and Meier (1998), if we permit multiple principals and allow that the relationship between principals and agents might be characterized by externalities, this will have a number of implications. Firstly, the existence of multiple principals strongly indicates that not all the principals will agree on goals. Goal conflict among principals makes the relationship between principals and agents exceedingly complex. Secondly, with multiple and conflicting principals, agents have little choice but to act as political institutions and attempt to build some type of coalition that supports their favorite policy. Thirdly, with the introduction of multiple principals, the principal-agent model offers no clear resolution of the question of which principals should be responded to and which should be ignored. Fourthly, the existence of multiple,

competing principals, and quite likely multiple and competing agents as well, means that pure information asymmetry is unlikely to occur.

Under information asymmetry among actors, one actor (normally the principal) who does not have complete information cannot know the character or information which the other actor (normally the agent) has before they finalize the contract with the agent. Nor can the principal observe all the activities which the agent undertakes on behalf of the principal after the contract is made (Dixit 2002, Lee 2008). According to Waterman (1998), principal-agent models can be divided into eight types, according to their characteristics of goal conflict and information level (see Table 2-7)

Table 2-7: Principal-agent models: combing goal conflict and information level

Goal conflict		Agent's information level	
		Low	High
Principal's information level	High	Type 4: Patronage system	Type3: Advocacy coalitions
	Low	Type1: Bumper sticker politics	Type2: Principal-agent

Goal consensus		Agent's information level	
		Low	High
Principal's information level	High	Type 8: Plato's republic	Type7: Policy subsystems
	Low	Type5: Theocracy	Type 6: Bottom line

Adopted from Waterman and Meier(1998)

Type1: Bumper sticker politics

This situation occurs when both principal and agent have little information, within an overall context of goal conflict between them. In such a situation, agents will not be trusted and will really have little productive role to play. If they participate in the political debate, they are just one interest group among many. Agents are likely to be distrusted by those on at least one side of the debate. Principals will remain active in implementation, with agents performing the role of clerk.

Type2: Principal-agent

This situation occurs when the principal has little information but the agent has a great deal of information, within a context of goal conflict between them. In such a situation, although the principal hires the agent in his own interest, as they have different goals and the principal cannot observe the agent's behaviour, the agent is likely to engage in behaviours which are not in the principal's interest. In principal-agent theory, this danger is referred to as 'moral hazard', a situation in which an agent does something on behalf of the principal that the latter cannot observe, under conditions where the principal and agent have differing objectives and asymmetric information (Lee 2008, Bertelli 2012).

Type3: Advocacy coalition

This situation occurs when both principal and agent have plenty of information but there are goal conflicts between them. In such a situation, the agent becomes one political actor among many: he or she does not have any claim to sole technical expertise, because there is no monopoly on information. In the case of multiple principals, the

politics in situations like this will resemble advocacy coalitions, with agents and principals aligned together on either side of the issue (Sabatier and Jenkins-Smith, 1993). In this model, the agent will have the classic principal-agent relationship with some principals (those on the other side) and a cooperative relationship with others (those on their side).

Type 4: Patronage system

This situation occurs when the principal has a great deal of information and the agent has little information, in a situation where there are goal conflicts between them. In this situation, the principal will dominate any relationship with an agent, since the principal has both legitimacy and technical knowledge. The agent will act essentially as personal staff to the principal.

Type5: Theocracy

This situation occurs when both principal and agent have little information, in a situation where there is goal consensus between them. In this situation, as issues become salient, the general strategy is for policy entrepreneurs to grab whatever ideas are floating around and adopt them. Here, principals can take credit for combatting the problem. Agents in this situation become advocates - or perhaps, more harshly, cheerleaders - for the principal's proposed solutions.

Type 6: Bottom line

This situation occurs when the principal has little information but the agent has plenty of information, in an overall context of goal consensus between them. In this situation,

agents will become technocrats and form relationships with principals that resemble those of the classic political-administration dichotomy. Agents are assigned a task with a clear goal and then are simply left alone, as long as no major disasters occur. Only if some major problem occurs does the principal intervene and try to take corrective action.

Type7: Policy subsystems

This situation occurs when both principal and agent have plenty of information, in an overall context of goal consensus between them. In this situation, we expect to see the classic policy subsystem, with symbiotic relationships between principals and agents. The agents will share goals with the principals and discretion will be granted to the agents as a result of trust.

Type 8: Plato's republic

This situation occurs when the principal has a great deal of information but the agent has little, in an overall context of goal consensus between them. In this situation, the relationship between the principal and the agent will be similar to the relationship between the philosopher king and his serfs. Agents, if there are any, have limited discretion and simply carry out the policies established by the principals.

From these eight types of relationship between principals and agents, we realized that the behaviours of each stakeholder in multiple-principal and multiple-agent models might be different from each other, according to the relationships which are formed by goal conflict and information asymmetry among stakeholders.

2.4.2.3. Adverse selection model

The second type of problem which can occur under information asymmetry is adverse selection. In this situation, the agent has some private information or hidden characteristics not revealed at the time the contract is made with the principal (Dixit 2002). Under conditions of information asymmetry, where the agent has much more information than the principal, the principal is in danger of making a contract with an undesirable agent whose actions will not be in line with the principal's interests (Lee, 2008).

2.5. Conclusion

This chapter has explored the previous research relevant to this study. The previous research into budget allocation decisions and the role of policy information in the decision-making process has been examined in order to throw light on the impact of PFS results on budgetary decisions. Second, theories relevant to the appropriateness of the AHP scoring methodology and the weighting process in the PFS have been explored. Third, theories covering the behaviour of each stakeholder in the project evaluation process have been explored in order to analyse the potential non-neutral behaviours of stakeholders which may affect PFS results. Lastly, theories of multi-tiered and multiple-principal and multiple-agent relationships have been explored to extract the policy implications for ways in which the non-neutral behaviour of stakeholders might be reduced in the PFS process. The next chapter will present an overview of the current PFS process and budget allocation process in South Korea.

CHAPTER 3 HOW DO THE PFS PROCESS AND THE RELATED BUDGET PROCESS OPERATE?

3.1. Introduction

This chapter provides an overview and analysis of the current Preliminary Feasibility Study and budget allocation processes in South Korea. It can be seen as answering the two following preliminary research questions in order to analyse the current system and provide the detailed contextual background for our main research questions, which will be presented in Chapter 4 and analysed in Chapters 5, 6, and 7.

① What is the methodological configuration of the overall project appraisal system in South Korea, as defined by laws and regulations?
② To what extent does the system actually follow the laws and regulations in practice?

As this study is about the relationship between PFS and budgetary decisions, the system which will be analysed can be divided into the PFS system and the related budgetary decision system. Following on from this, the detailed preliminary research question can be divided into three questions, as follows.

- What are the requirements for new projects to have budget approval (Budget Selection, hereafter BS) and to have an annual budget released (Budget Pace, hereafter BP) in the laws and regulations?

- How do the scoring and weighting systems work, in combination with other practices and factors, to determine PFS results according to the laws and regulations?
- Do these systems actually follow the laws and regulations to the letter?

These research questions will be addressed by documentary research and interviews. The main research questions occur later in the thesis (Chapter 4) and will be discussed in detail in Chapters 5, 6, and 7. This chapter is composed of three sections. Firstly, an outline of the PFS system will be given, including the life cycle of large-scale public investment projects (Section 2). Secondly, the requirement for new projects to have budget approval and have an annual budget released, as formally specified in laws and regulations, will be examined. After that, we shall explore whether this system actually follows the laws and regulations (Section 3). Thirdly, the mechanism for scoring and weighting to determine PFS results will be examined and the difference between the theory and practice will be also explored (Section 4).

3.2. What is a preliminary feasibility study (PFS)?

3.2.1. The life cycle of a large-scale public investment project in Korea

Korea has made great efforts to operate its public finances more effectively. Currently, Korea uses the Preliminary Feasibility Study (PFS) system as a proactive performance management system and uses Self-assessment of Fiscal Projects and a performance plan and report system for evaluation of performance. As seen in Table 3-1, there are six stages in the large-scale investment policy cycle and the government system for operating public finances more effectively: PFS, Total Project Cost Management (TPCM), Re-assessment Study of Feasibility (RSF), Re-assessment of Demand Forecast (RDF) and Evaluation (Kim 2007).

Table 3-1: Life cycle of a large-scale public investment project in Korea

Ex Ante		Intermediate		Ex Post
①Planning	②PFS	③ Design	④ Construction	⑤ Operation
	PFS		***TPCM, Budgeting, RSF[10]***	***Evaluation***
Line Ministry	-MOSF: Financial Policy Bureau - KDI: PIMAC[11]	Line Ministry	-TPCM (MOSF: Budget Office) -Budgeting (MOSF: Budget Office) -RSF (MOSF: Financial Policy Bureau, KDI: PIMAC)	-Line Ministry -MOSF: Financial Policy Bureau

[10] TPCM (Total Project Cost Management), RSF (Re-assessment Study of Feasibility)
[11] PIMAC (Public Investment Management Centre)

Planning

Planning is the first stage in the life cycle of a large-scale public investment project in Korea. This stage is labeled ‘business justification’ or ‘identification and preparation’ or just simply ‘planning’ by the Office of Management and Budget (OMB), the Office of Government Commerce (OGC) and the Operations Evaluation Department (OED). The planning stage can be described as a review-in-advance stage which is composed of a review of the relationship with other related plans (Lee 2006). In the planning stage, the line-ministry offers its opinion on the justification for the launching of a project.

Preliminary Feasibility Study (PFS)

This is an overview survey preceding a detailed feasibility study aimed at budget planning and setting priorities (described later).

Total Project Cost Management (TPCM)

TPCM is the system which manages and adjusts the total cost and project period according to the project management phase. According to the National Fiscal Act enforcement ordinance (2006), line ministries who are going to launch projects whose total cost is above 50 billion Won, and whose project period is longer than two years, are required to have a prior consultation with the MOSF. They also have to consult with the MOSF when they want to change the total cost and demand expectations in the on-going period.

Re-assessment Study of Feasibility (RSF)

In contrast with the PFS, which assesses the feasibility and desirability of large-scale projects before launching, the RSF is a system which assesses the feasibility and desirability of on-going projects. However, the method of assessment for an RSF is the same as for a PFS, and projects which are assessed as 'not-recommended' through RSF are suspended. RSF is a part of Total Project Cost Management (TPCM), which manages and adjusts the total cost according to each project's management phase. According to the National Fiscal Act enforcement ordinance (2006), large-scale projects (total costs amounting ≥ 50 billion Won) with one of the following characteristics are subject to an RFS.

① Projects for which the total cost goes above 50 billion Won after launching.

② Projects launched without PFS, in spite of the fact that they should have been assessed by PFS.

③ Projects for which the total cost, excluding adjustment for inflation and compensation for loss, increases by 20 per cent more over the original cost, as confirmed by PFS.

④ Projects for which the demand is forecasted to decrease by 30 per cent from what was expected at the time of their PFS.

Budgeting

Budgeting is the activity that involves decisions on budget allocation for large-scale projects. According to the budget guidelines (MOSF 2013), budgeting can be divided

into two types: budget approval for new projects and budget allocation for on-going projects (described later).

Evaluation

Evaluation is the activity that involves the assessment of a project's outcome after completion of the project. This stage is defined as 'management in use' by OMB, 'readiness for service and benefit evaluation' by OGC and 'independent evaluation' by OED respectively.

In Korea, this evaluation can be implemented through individual government acts, such as the Act for the Management of Construction, where the line-ministry has to draw up an evaluation report which forecasts the effects of construction after completion of the project (Lee 2006).

3.2.2. Outline of Preliminary Feasibility Study (PFS)

1) Definition of PFS and alternative definition for it

According to the KDI (2012), a Preliminary Feasibility Study in Korea can be defined as 'an overview survey preceding a detailed feasibility study which is aimed at budget planning and priority setting'. A PFS is the first step of a project, and its results will have an impact on the later phases of the project. PFS is described as a system for selecting between large-scale public investment projects and is intended to subject such projects to transparent and objective ex-ante project evaluation.

With respect to the definition of a PFS, some may argue that the above definition cannot reflect the real character of a Korean PFS. The two main issues which are raised here are as follows. The first issue is about the meaning of the word 'feasibility'. The meaning of the word in this study is different from its meaning in the narrow sense, which is limited to the possibility of implementation. The narrow sense of feasibility is composed of financial, political, technical, ethical and legal senses. However, a Korean PFS is composed of appraisal of the desirability as well as of the feasibility of a project, because the appraisal sub-factors that contribute to PFS results are composed of economic factors (efficiency related to desirability), factors that impact on balanced regional development (equity related to desirability), and policy factors (financial and environmental feasibility). Thus, the generally accepted meaning of 'feasibility' cannot reflect the real character of a Korean PFS. In order to reflect this real character, a new use should be coined that includes the two different notions of desirability and feasibility. The second issue is about the role of the PFS process, and the fact that the meaning of 'overview survey' in the definition of a PFS cannot reflect the role of the Korean PFS as a policy recommendation. The Korean PFS is not a simple survey[12] but a policy recommendation of which the characteristics are actionable, prospective and value laden. First of all, the policy recommendation is actionable (Dunn 2003). The Korean PFS may have this characteristic because the actionable features of projects (that is, their feasibility in a narrow sense) can be analyzed through the policy analysis, which evaluates feasibility in the context of policy factors: consistency with a higher level plan, project risk, and project-specific factors. As well as being actionable, policy

[12] A method for collecting quantitative information about certain items from a population. A survey provides a quantitative or numeric description of the trends, attitudes, or opinions of a population by studying a sample of that population (Creswell, 2009, P. 12).

recommendations are prospective. The Korean PFS may have this characteristic because, by law, it should be implemented prior to budget approval being given to a project. Lastly, policy recommendations are value laden. This characteristic can be defined as being related to desirability, which involves the perception that behavioural outcomes are socially and personally desirable (Krueger and Brazeal 1994). According to Dunn (2003), recommending policy requires that the predicted consequences are valued by individuals, groups, or society as a whole. A Korean PFS may have this characteristic because it has two criteria related to desirability: economic analysis (efficiency) and balanced regional development (equity).

Considering these two issues and the characteristics of the Korean PFS process, we shall call it a 'Preliminary project Recommendation Process (hereafter PRP) whereby the KDI selects candidates for budget approval by the MOSF, because this notion suitably reflects the role of the current system as providing policy recommendations, and it avoids misleading the reader as to the characteristics of the current system, which includes both a feasibility study and a disability study.

2) The history of the PRP in South Korea

The PRP process was introduced in Korea in April 1999 as a public sector reform initiative in the wake of the financial crisis of 1997-98. Since the 1970s, line ministries have conducted Feasibility Studies as part of the process of dealing with applications for government funding. During this period, the Feasibility Study process was used to underestimate costs and to overestimate benefits, because the Feasibility Study team used to be under the influence of the line-ministries. Consequently, between 1994 and

1998, 32 out of 33 projects were evaluated as feasible in the Feasibility Study process. For this reason, the Ministry of Planning and Budgeting tried to take over the Feasibility Study process from the line ministries, and PRP was 'invented' as a solution to the problem, despite resistance from the line-ministries.

The PRP process was revised in 2003 through adopting the AHP, which was based on the outcome of economic analysis and policy analysis and used to evaluate the feasibility of projects in a comprehensive manner reflecting the opinion of analysts. In the year 2006, it was revised again through separating regional factors from policy factors. Thus, since 2006, the AHP has been based on the outcome of three appraisal sub-factors: economic, policy and regional. The Public Finance Act of 2006 provides the legal framework for the PRP. Before the passing of the Public Finance Act, the PRP was based on the Enforcement Decrees of the Budgeting and Accounting Act and Fund. These two Acts were merged into the Public Finance Act in 2006.

The PRP is the responsibility of the Ministry of Strategy and Finance (MOSF) and is managed by the Korea Development Institution (KDI). The process can be seen as acting to mitigate information asymmetry between the MOSF and the line ministries and leading to better decision-making (Park 2007).

3) Projects subject to the PRP

According to the Public Finance Act (2006), all new large-scale projects with total costs amounting to 50 billion Won (£27 million) or more are subject to the PRP, of which the results are important over the whole period of the project in the context of budgeting. The following types of projects are exempted from the PRP as exceptions:

- Typical building projects, such as government offices and correctional institutions
- Legally required facilities, such as sewage and waste treatment facilities
- Rehabilitation projects and restoration after natural disasters
- Projects implemented based on international accords and undertaken by inter-Korean exchange and cooperation programs
- Military facilities and projects related to national security.

4) The PRP and related budget allocation

The PRP and related budget allocation are composed of seven steps, as follows (Figure 3-1).

① A line ministry requests PRP analysis to the MOSF, and the MOSF passes the request to the PRP Committee.

The chairman of each line-ministry that wants to put forward a large-scale project is required to request a PRP for the project two years before they wish to proceed, as the PRP takes approximately six months and the budgeting takes approximately one year (MOSF 2013).

② The MOSF selects the projects for the PRP and requests service through the PRP Committee

The MOSF selects the projects which will be subjected to the PRP in a specific year according to a comprehensive view such as mid-to-long-term investment planning, the business plan, the urgent need for business promotion, fiscal support requirements, and balanced regional development (MOSF 2013).

③ The KDI makes a choice of appraisers from the policy analysts pool, which is composed of KDI analysts, university professors and private company analysts, in order to bring together a PRP team

The PRP analysis is carried out by a team and the decision made in the PRP analysis is a team decision. For this reason appraisers must satisfy two factors. Firstly, they have to have sufficient knowledge on the subject of the project being appraised. Secondly, they need to be objective in their views about the public interest. According to these two factors, the PRP team is composed of around six to seven persons, such as a KDI research director, analysts from the PIMAC (Public Investment MAgement Center), professors, and analysts from private companies. Government officers in budget offices are excluded because they may take the opportunity to reflect their opinions through the decision-making process. Taking the Beulnae Railroad appraiser group as an example, this is composed of six experts: two professors from Seoul Industrial University, two experts from the private sector and two PIMAC analysts.

④ The KDI conducts the PRP, which is composed of a background study, economic analysis, policy analysis, balanced regional development analysis and an Analytic Hierarchy Process.

A PRP is performed, in principle, within four months. However, taking into account the destination and nature of business surveys performed during the period, the period can be extended (MOSF 2013).

⑤ The KDI Consults related agencies on major issues.

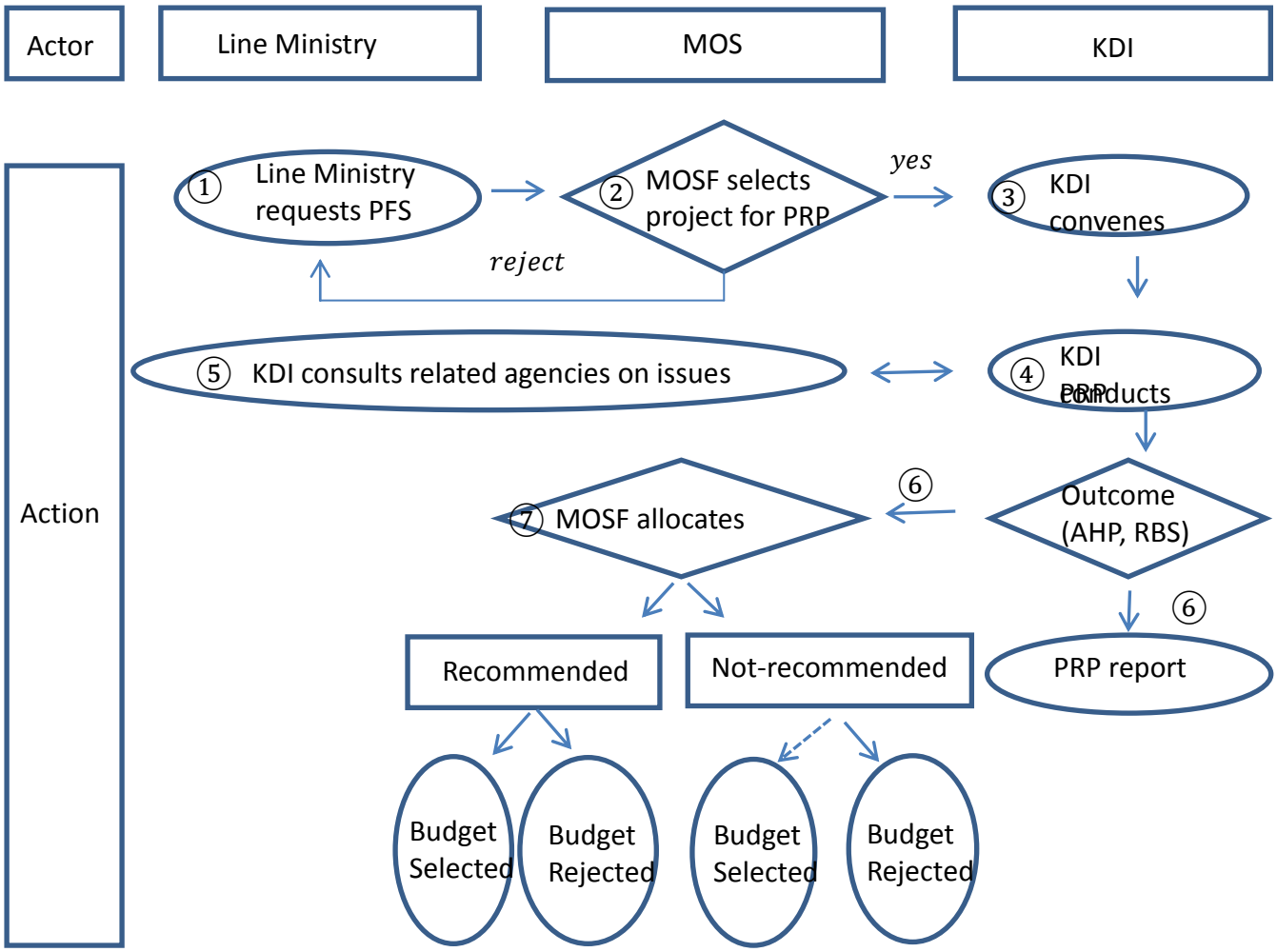
⑥ The KDI informs related agencies of the results of the PRP, which are composed of AHP scores and the scores for appraisal sub-factors, and prepares study report on project.

The KDI carries out a PRP and submits a final report to the Minister in charge of the MOSF upon completion of the PRP. After this the KDI must disclose the results of the PRP through its website (MOSF 2013).

⑦ The MOSF gives budget approve on new large-scale projects – or it doesn't.

The MOSF decides on budget allocation for new projects (Budget Selection; BS) with reference to the results of the PRP. Usually, the MOSF has discretion on decisions on budget allocation. However, as there is ban in the annual guidance for budget requests (MOSF 2013) on allocating budgets to projects which are assessed as 'not-recommended', BS decision for these projects involves violation of the guidelines by the MOSF. On the other hand, as there are no regulations on the allocation of budgets to 'not-recommended' projects in the Public Finance Act, BS decisions on these projects does not count as flouting the law.

Figure 3-1: PRP and related budget allocation process



3.2.3. The basic system of the PRP

In the PRP, each project is treated as an individual case. The basic system of the PRP is composed of three parts as follows.

① A background study: the background study is composed of a review of the statement of purpose, the collection of diverse data, and brainstorming for alternatives to the items proposed. Through this process the issues of the project are raised.

② Implementation of analyses of appraisal sub-factors

②-1 Implementation of an economic analysis: the economic analysis is composed of data analysis, cost and benefit estimation, cost-benefit analysis, sensitivity analysis and financial analysis.

②-2 Implementation of a policy analysis: the policy analysis investigates consistency with higher-level plans and policy, project risks, and project-specific evaluation items.

②-3 Implementation of an analysis of whether the project contributes to balanced regional development: the regional development analysis includes the establishment of a regional backwardness index and an analysis of regional economic impact.

③ An AHP: in the AHP there is a synthesis of the results of the investigations of economic policy and balanced regional development.

3.2.4. Outline of the Beulnae Railroad project

As the PRP is complicated, it is helpful to use an example to clarify its various steps. Here, a railroad project, the Beulnae Railroad, will be taken as an example of the PRP. The Beulnae Railroad project is a project for building 13.1 km of railroad between Guri city and Seoul city. The expected project period is 10 years, from 2007 to 2016, and the estimated total cost is 997 billion won (about 55 million pounds). The Beulnae Railroad project is a good example to explain the Korean PRP for several reasons. Firstly, in this project, the RBS decision, which is decided by the AHP score, and the efficiency decision, which is determined by B/C ratio (one of the appraisal sub-factors of the AHP) are different. Although this project was appraised as an inefficient project (B/C = 0.91<1.0), it was appraised as a recommended project (AHP = 0.508≥0.5). Normally, considering that, among the appraisal sub-factors, the weight of B/C was almost 46 per cent, it would have been difficult for an inefficient project like this (B/C<1.0) to be appraised as a 'recommended' project (AHP≥0.5). Thus, this projects is a good example through which to explain the weighting which enabled a positive recommendation despite the project's low B/C ratio. Secondly, in this project, the outcome of the project recommendation would change if the weightings were changed from those produced by the policy analysts working on the project (economic: 47 per cent, policy: 32 per cent, balanced regional development: 21 per cent) to the averages of the range of weightings permitted by the guidelines (46 per cent, 31 per cent, 23 per cent, see Table 3-2). Although, this project was appraised as 'recommended' (AHP = 0.508), if the weighting portfolio were changed to these percentages, it would be appraised as 'not-recommended' (AHP = 0.461).

Table 3-2: Weighting range of the AHP

	Appraise factors		
	Economic	Policy	Balanced regional development
Guidelines	40-50%	25-35%	15-30%
Average (by guidelines)	46%	31%	23%
Beulnae railroad	47%	32%	21%

Thirdly, there was relatively strong support for the launching this project because the constituency through which the railroad would run belonged to ruling party in 2006 when the PRP was implemented and in 2008 when the budget was allocated. As seen from Table 3-3, the PRP was implemented in the year 2005-2006 when the assembly member for Guri city was Mr Yun, who belonged to ruling party A. However, the Beulnae Railroad project was implemented as budgetary project in the year 2009, when the assembly member for Guri city was Mr Ju, who belonged to ruling party B.

Table 3-3: Political change in Guri city and the project process

	2003	2004	2005	**2006**	2007	2008	**2009**	2010
President	Mr RO (party A)					Mr LEE (party B)		
Assembly member		Mr YUN (party A)				Mr JU (party B)		
Project			**PRP**				**Launched**	

3.2.5. Appraisal and evaluation of public sector project proposals in the UK : *The green book*

Over a period of time, the UK has developed *The green book*, which contains government guidelines for the appraisal and evaluation of policies and capital projects. *The green book* is used for this purpose in government departments and executive agencies throughout the UK. All new policies and projects should be appraised in accordance with its guidelines before they are started. All manuals or guidelines drawn up by departments and agencies in order to advise on proposals in their specific areas should be consistent with the principles of *The green book* (Treasury 2011), 2010).

Compared to the PRP in South Korea, *The green book* has several differences. Firstly, *The green book* is a best practice guide for all central departments and executive agencies, and covers all types and size of project. However, only new large-scale public projects with a total cost of 50 billion Won or more (using government funds of more than 30 billion Won) are subject to the Korean PRP. Secondly, the most significant role of the analysis provided in *The green book* is the creation of a wide range of project options for reviewing techniques that will help users find appropriate solutions for achieving their goals. However, as the purpose of the Korean PRP is to support budget planning and budget priorities (Park 2007), the process does not usually consider all the options, but provides preliminary feasibility and desirability tests only for projects which are the subject of requests by line ministries. Thirdly, according to *The green book*, making adjustments to costs and benefits is an important part of appraisal, and such adjustments will often be required to take account of the distributional impact of benefits. However, there is no requirement to consider this distributional impact in the

Korean PRP guidelines. Last but not least, according to *The green book*, the results of an appraisal should be reported to decision-makers in the form of an analysis of the full scenario, not just as single point estimates of expected values. However, according to the Korean PRP guidelines, single point estimates of expected values (the AHP) and recommendations (RBS) which are determined by AHP scores are presented to decision-makers and may be used to prevent the acceptance of 'not-recommended' public projects.

3.3. What are the requirements for new projects to gain budget selection (BS) and then to have an annual budget released (BP)?

3.3.1. What is the system as defined by the laws and regulations?

3.3.1.1. Budget allocation process in South Korea

The budgeting process in South Korea is composed of four stages: ① budget preparation, ② budget deliberation and finalization, ③ budget execution, and ④ budget settlement and evaluation. These processes form an interdependent cycle because one step affects the other steps and the results of budget settlement and evaluation can affect the next year's budget compilation (Ahn 2010).

① *Budget preparation*

Budget preparation is defined as the processes through which expenditure on planned government projects is concretized. Usually, the administration (the ministries) takes charge of budget preparation, although some government cabinets have also been empowered to do this. The administration in Korea has the authority to undertake budget preparation under the terms of the Constitution (Article 54). According to the National Finance Act, budget preparation is composed of four steps: the establishment of National Mid-Term Fiscal Policy, the issuing of budget preparation guidance, the presentation of budget requests by line-ministries, and the discussion of budget requests between the Ministry of Strategy and Finance (MOSF) and line-ministries.

② *Budget deliberation and finalization*

Budget deliberation and finalization is the process whereby the budget is finalized. Usually the National Assembly takes charge of budget deliberation and finalization. They have the power to amend the budget submitted by the administration. The extent of this power to amend differs between countries. For example, the equivalents of the National Assembly in the UK and Canada have only the power to cut budgets requested by the administration, they do not have the power to increase budgets or to approve budgets for new projects which are not put forward by the administration through the process of budget preparation. In Spain and South Korea, the National Assembly has the power to increase the budget, on condition that the administration approves it (Ahn 2010). According to the Korean Finance Act, the process of budget deliberation and finalization is composed of three steps; ① preliminary deliberation by standing

committees, ② comprehensive deliberation by the Special Committee on Budget and Accounts, and ③ finalization by an assembly plenary session.

③ *Budget execution*

Budget execution can be applied to all the activities a government undertakes in order to implement their country's income and expenditure budget. The function of budget execution involves not only implementing the finalized budget but also responding to emergencies that were not foreseen at the budget finalization stage (Ahn 2010). According to the Finance Act, the process of budget execution is composed of three steps: ① budget assignment, ② budget reassignment, ③ expenditure obligations, ④ earmarked funds, and ⑤ financial execution. The minister of the relevant line-ministry submits a request for budget assignment to the MOSF, and in response to this the MOSF drafts a plan for budget assignment and then raises this draft plan at a cabinet meeting where the final budget assignment plan is decided. After this process, the budget is implemented according to the plan.

④ *Budget audit and evaluation*

The administration implements annual revenue and expenditure arrangements according to the finalized budget which was agreed by the National Assembly. According to the Finance Act, the results of this implementation should be checked through an audit by the Board of Audit and Inspection. Parliament then reviews the results of the audit and after this the audit results are reflected in the next year's budget process.

3.3.1.2. Specific requirements for budget allocation on large-scale projects

When it comes to the allocation of budgets to large-scale projects, there are several special factors which are considered when a line-ministry requests a budget and the MOSF decides the budget as a result of the PRP. Firstly, the MOSF is obliged to implement the PRP on large-scale projects when it decides the budget allocation for these. According to the National Finance Act, the MOSF should implement the PRP before it makes budgetary decisions (BS) for large-scale projects and should report the PRP results to the National Assembly. The projects that are exempted from the PRP are mentioned in the enforcement ordinance for the National Finance Act. Secondly, line-ministries are allowed to request budgets only for projects which are appraised as 'recommended' through the PRP. According to the *Guidance for the PRP* (MOSF 2013), the head of each line-ministry can request a budget for 'recommended' projects (e.g., AHP $\geq$ 0.5) considering the conditions related to such projects such as the financial resources available, the opinion of municipalities, and the commercial need for them. Thirdly, the MOSF should make decision on budget allocations for large-scale projects according to the results of the PRP. According to the the *Annual Guidelines for Budget Requests*, in principle, the projects which are appraised as 'recommended' through the PRP can be selected by MOSF for BS (MOSF 2013) . Fourthly, according to the *Annual Guidelines for Budget Requests* (MOSF, 2013), like other public finance projects, budget allocation decisions on large-scale projects can be divided into two: budget allocations for new projects (BS); and annual budget allocation for ongoing projects (BP). Lastly, according to the *Annual Guidelines for Budget Requests* (MOSF, 2013), there is a standard time profile for budget allocation according to the number of years

projects will take and this dictates when MOSF officials allocate budgets to ongoing large-scale projects (see Table 3-4). As the project process can be divided into six steps – ① Set up a draft project plan, ② Implement the PRP, ③ Set up a basic project plan, ④ Set up a basic design, ⑤ Set up an enforcement design and ⑥ Arrange construction (Ahn 2010) – and budget approval on new projects can take place only after the PRP, the time profile for budget allocation for ongoing projects (see Table) can be based on the last four steps. As seen in Table 3-4, as it takes more time to set up the design of large-scale projects than that of relatively small projects, the time profile of budget allocation for ongoing projects is likely to involve some back loading as the total number of project years is longer.

Table 3-4: Time profile of budget allocation for ongoing projects according to the guidelines

(Unit: ratio)

	Time profile of accumulated budget allocation								
	Annual budget allocation ratio(annual budget allocation/planned total cost)							Accumulated budget allocation ratio (BP[13])	
Total project years	1st	2nd	3rd	4th	5th	6th	7th	Mid-term	Long-term
2	50	50						50	100
3	30	40	30					50	100
4	20	20	30	30				40	100
5	15	15	20	30	20			40	100
6	10	10	15	20	25	20		35	100
7	10	10	10	15	15	20	20	38	100

[13] The 'Budget allocation Pace over time for ongoing projects (BP)' can be measured by the accumulated ratio of the annual budget approved over time to planed total budget for each large-sale project which is confirmed by the National Assembly. The definition of BP, mid and long-term will be described detail in chapter 5.

3.3.2. Does the system actually follow these laws and regulations to the letter?

3.3.2.1. Some 'not-recommended' projects were selected for budget approval

According to the laws and guidelines for the granting of budgets, being 'recommended' for budget approval (BS) through the PRP is an essential requirement for budget approval (BS) on new projects. So, if the system actually follows this law, no projects appraised as 'not-recommended' will be selected for budget approval.

However, there have been several projects which were 'not recommended' for budget approval but were selected by the MOSF for budget approval. According to an analysis of the empirical data between 2006 and 2010, nine out of 73 projects which were 'not recommended' by the KDI were selected for budget approval (see Table 3-5).

Table 3-5: Recommendation and selection for budget approval

(Unit: number of projects)

		Budget Selection (BS decision by MOSF)		Total
		Rejected	Selected	
Recommendation (RBS decision by KDI)	Not-recommended AHP<0.5	64	**9**	73
	Recommended AHP≥0.5	24	107	131
Total		88	116	204

3.3.2.2. Exploring the factors that affect budget decisions on large-scale projects

According to to the laws and guidelines for the granting of budgets, there is no guidance for using PRP results (AHP scores) for decisions on accumulated annual budget release over time (BP). Furthermore, there is also no guidance for using other factors which affect budgetary decisions on large-scale projects. However, according to interviews with experts and MOSF officials, there are several other factors which affect budgetary decisions on large-scale projects and, furthermore, some interviewees stated that PRP results (AHP scores) were also used for decisions on accumulated annual budget release over time (BP).

We draw several findings from the first interview results in relation to the factors which affect budget decisions. Firstly, there are four main factors which affect budget decisions on large-scale projects, and these are: need for the project, PRP results, budget constraints and political/organizational pressure (see Table 3-6). On the other hand, the impact of each factor on budget decisions for large-scale projects is different, according to the type of budget decision taken. As seen from Table 3-6, in the case of decisions on budget approval (BS) for large-scale projects, the important factors for this decision are the need for the project, the PRP results, budget constraints and political pressure, in that order. On the other hand, in decisions on budget allocation over time (BP), the need for the project and political pressure play more important roles than the PRP results and budget constraints.

Table 3-6: Criteria affecting decisions on budget approval (BS) and budget allocation over time (BP)

(Unit: number of coding)

		MOSF			Expert	Total
		Budget office	Finance bureau	Sub-total		
Decision on budget approval (BS)	PRP results	2	2	4	1	5
	Need for the project	2	3	5	1	6
	Budget constraints	0	2	2	0	2
	Political pressure	1	1	2	0	2
	Sub-total	5	8	13	2	15
Decision on budget allocation over time (BP)	PRP results	1	1	2	0	2
	Need for the project	2	2	4	1	5
	Budget constraints	1	1	2	0	2
	Political pressure	2	1	3	0	3
	Sub-total	6	5	11	1	12

Secondly, two MOSF officials stated that the AHP score might be a good indicator when they made decision on BP (see Table 3-6). This distinction is illustrated in the words of one MOSF official, who described the role of PRP results as follows:

> *Policy direction, financial burden and political pressure play important roles in making decisions on budget allocation over time. Furthermore, as it is impossible to know the effect of large-scale construction projects before they are constructed, the AHP score, which is appraised in relation to several factors in advance, may be a good indicator for making decisions on annual budget allocations for projects (interviewed 27th Nov 2012).*

Thirdly, as concerns the role of PRP results, although these play an important role in decisions on assigning budgets to large-scale projects, decision-makers consider them to

be a necessary condition but not, by themselves, a sufficient condition for assigning a budget. From this it may be supposed that some decisions on BS are not what might be expected given the PRP results involved. One MOSF official stated that

> *The need for a project at the national level is the most important criterion for budget approval on large-scale projects. For example, major government projects are likely to receive a budget allocation because they are supported by the President. In the period of President Lee, 30 leading projects which could lead local development and were related to several projects in their local area were easily launched and got budget allocation. Although the AHP score is the second most important criterion, it is only a requirement for getting budget approval (BS) on large-scale projects (interviewed 1st Dec 2012)*

3.3.2.3. Time profile of budget allocations for large-scale projects

According to the laws and guidelines for the granting of budgets, there is a standard time profile for budget allocation (BP) according to the total number of years a project will take and MOSF officials allocate budgets to ongoing large-scale projects according to this (see Table 3-4). However, it is important to recognize that there are too many budget limitations to allocate budgets to on-going projects following the standard time profile for budget allocation to the letter. For this reason, the actual accumulated budget ratio (BP) does not reflect the standard time profile for budget allocation.

Table 3-7 shows the time profile of budget allocations for ongoing projects which had their PRP results checked between 2003 and 2005 and had their budget agreed by central government between 2003 and 2012. Considering the AHP, adopted in 2003, the

maximum period for planned projects (seven years) and the one-year gap between the PRP and the budget process, the budget data collected between 2003 and 2012 may be particularly useful for comparing the time profiles of budget allocations for ongoing projects between the mid and long terms. Table 3-7 shows that the number of projects taken forward as new public projects from among the projects which had their PRP results checked between 2003 and 2005 is 62; and the mean time profile for the accumulated budget allocation ratio for large-scale projects in the long-term is 65.1 per cent, which is about twice the size of that in the mid-term (32.3 per cent). However, we also realized that these actual BPs were less than the standard BPs according to the guidelines (100 per cent for long-term, 50 per cent for mid-term, see Table 3-4).

Table 3-7: Time profile of budget allocations for large-scale projects

(Unit: number of project, ratio)

		Mid-term[14]	Long-term[15]
Data	Number of projects	62	
	PRP year	2003-2005	
	Budget year	2004-2012	
Actual accumulated budget allocation ratio (%)		32.3	65.1
Standard accumulated budget allocation ratio in guidelines (%)		50	100

[14] Middle year of the planned project year (the detailed meaning will be explained in Chapter 5)
[15] Last year of the planned project year (the detailed meaning will be explained in Chapter 5)

3.4. How do the scoring and weighting systems work, in combination with other practices and factors, to determine PRP results?

3.4.1. What is the system as defined by the laws and regulations?

3.4.1.1. The AHP as a multi-criteria analysis for the PRP

The AHP is about decision-making processes which consist of breaking down a problem and drawing conclusions by aggregating the solutions to all the sub-problems (Saaty 1990). The AHP has been the main process for producing PRP results since the Korean government adopted it in the year 2003. The AHP is one of the decision techniques which support systematical evaluation of alternatives which have a different affinity for each evaluation criterion and which are evaluated under different targets and diverse evaluation criteria (KDI 2012). The AHP consists of ① grouping similar evaluation factors in a set, ② combining these sets into a homogenous level and ③ comprehensively analyzing each level, leading to a final decision. The KDI adopted the AHP through comparing various multi-criteria analyses and has amended it and used it as tool for the PRP. Multi-criteria analysis is a decision-making method which draws out a best solution to satisfy multiple objectives considering multiple attributes. Multi-criteria analysis which is composed of economic analysis, policy analysis and balanced regional development analysis is needed in the PRP for several reasons (KDI 2012). Firstly, it is difficult to integrate the results of quantitative analysis and qualitative analysis. Secondly, it is difficult to combine different assessment items which have different scales. Thirdly, it is difficult to reflect simultaneously both consistency of assessment and the specifics of projects. Lastly, it is difficult to draw final conclusions

by aggregating the opinions of analysts who take part in an assessment. In 2003, the Korean Development Institution (KDI) developed the AHP in order to enhance the consistency of PRP results and enable decision-makers to understand PRP results. The AHP enables policy analysts not only to overcome the limitations of economic analysis, but also to do quantitative assessment on non-economic policy effects. The steps of the AHP for the PRP are brainstorming, structuring, weighting, consistency testing, scoring, and feedback (Ko 2007). The process of analysis, which is based on the AHP, enables policy analysts to express their preferences. The decisions of policy analysts are influenced not only by the amount of knowledge they have, their value-system, and psychological factors, but also by their objective function. For this reason, according to previous research, there are several debates about the role of policy analysts (value neutral experts vs. opportunistic decision-makers).

3.4.1.2. The use of the AHP in the PRP to determine PRP results

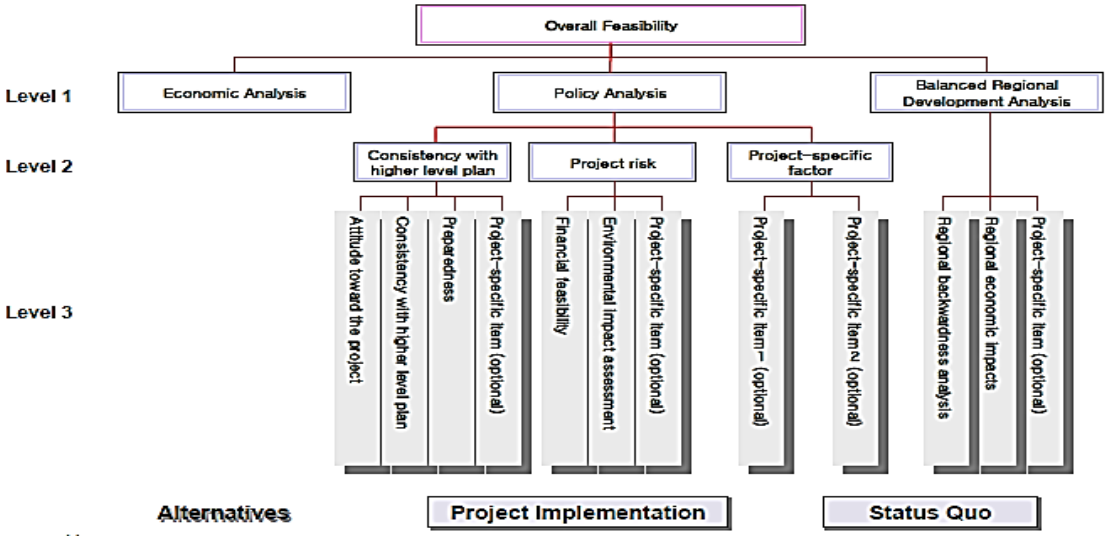
The steps of the AHP for the PRP are conceptualizing and structuring, weighting, scoring, synthesizing, and drawing conclusions (KDI 2012). As the main processes are weighting and scoring for producing PRP results, these two processes will be explained fully through the example of the Beulnae Railroad project.

1) Conceptualizing, structuring

The first step of the AHP is conceptualizing the form of the assessment framework, with its appraisal goals and appraisal factors, and considering alternatives, constraints, who is doing the appraising and the other people concerned. Through this process, the appraiser can gain greater understanding of a project and can share this information.

Brainstorming is commonly used for conceptualizing. The structuring step involves sorting the appraisal factors which are of varying importance and have different ranges into groups of similar items and arranging these groups in a hierarchy. As seen in Figure 3-2, the first level of the AHP is composed of economic analysis, policy analysis and balanced regional development analysis, and the second of these, policy analysis, is composed of consistency with a higher level plan, project risks and project-specific factors, which together form Level 2. The third level of the AHP consists of detailed appraisal criteria for the level 2 factors that make up policy analysis and detail appraisal criteria for balanced regional development analysis. As project-specific items mean that the appraisal sub-factors should be considered in appraising specific projects, appraisers have discretion in selecting project-specific items as appraisal sub-factors. For this reason, there are many projects which have no project-specific items as appraisal sub-factors. As for preparedness, it means how well the projects were prepared before they were subjected to the PRP, it can be appraised through features such as the construction of the project plan and the input required in terms of the labor force and finance. For this reason, appraisers can omit this appraisal factor when they appraise railroad and road projects, which are put together by main agents who are in charge of generating the project, such as the Regional Construction and Management Administration and the Korean Rail Network Authority. According to the data for 2006-2010, only 76 projects out of a total of 204 processed in this period had preparedness as an appraisal sub-factor. Lastly, analysts make a decision as to whether to implement a project on each of its appraisal factors.

Figure 3-2: Structure of AHP



Source: KDI (2012)

Let me take the Beulnae Railroad as an example. As a result of brainstorming among appraisers, the structure of the AHP for the Beulnae Railroad project was composed of basic appraisal sub-factors only (see Table 3-8).

Table 3-8: Structure of AHP for the Beulnae Railroad project

Appraisal sub-factors			Structure of Beulnae Railroad
Level 1	Level2	Level3	
1. Economic analysis			Y (selected as appraisal factors)
2.Policy analysis			Y
	1)Consistency and attitude		Y
		①Consistency with a higher plan	Y
		②Attitude toward the project	Y
		③Preparedness	N (rejected as appraisal factors)
		④Project specific item (optional)	N
	2)Project risk		Y
		①Financial feasibility	Y
		②Environmental impact	Y
		③Project-specific item (optional)	N

	3)Project-specific factor (optional)	N
3.Balanced regional development		Y
	1)Regional backwardness analysis	Y
	2)Regional economic impact	Y
	3)Project specific item (optional)	N

2) Weighting

Appraisers can create a weighting portfolio out of appraisal factors using pair comparison between the appraisal factors. As seen in Table 3-9, considering the influence of the different factors, the weighting range for the first level is set – according to the guidelines – as follows: economic analysis (40-50 per cent), policy analysis (25-35 per cent), balanced regional development analysis (15-30 per cent).

Table 3-9: Weighting range of the AHP

	Appraisal factors		
	Economic analysis	Policy analysis	Balanced regional development analysis
Until '06	40-50%	25-35%	15-25%
From'07	40-50%	25-35%	15-30%

During the weighting process, appraisers are asked several times about their relative preference on every pair of assessment items which belong to the same level. If there are 'n' number of assessments items, paired comparison will be implemented nC2 (=n×(n-1)/2) times and the final weighting can be obtained. Let us take the basic PRP as an example. We can see from Table 3-10 that the number of assessment items which are needed for pair comparison is three, two and two at each level (Levels1, 2 and 3). Firstly, three instances of paired comparison will

be implemented at Level 1, because there are three factors which should be compared: the economic factor, the policy factor and the balanced regional development factor. Secondly, two instances of pair comparison will be implemented at Level 2: one for the sub-appraisal factor of policy analysis, which is itself composed of two appraisal sub-factors – consistency and attitude, and project risk – and the other for the appraisal sub-factor of balanced regional development, which is composed of two appraisal sub-factors – regional backwardness and regional economic impact. Lastly two pair comparisons will be implemented at Level 3: one for the appraisal sub-factor of consistency and attitude, which is composed of two appraisal sub-factors: ①consistency with a higher plan and ② attitude toward the project; and the other for the appraisal sub-factor of project risk, which is composed of two appraisal sub-factors: ①financial feasibility and ②environmental impact.

Table 3-10: Pair comparisons at each level

<table>
<tr><td></td><td colspan="3">Sub appraise factors</td></tr>
<tr><td>Level</td><td>Level 1</td><td>Level2</td><td>Level3</td></tr>
<tr><td>Pair comparisons made</td><td>3 times</td><td>2 times</td><td>2 times</td></tr>
<tr><td rowspan="10">Appraisal sub-factors</td><td colspan="3">1. Economic analysis</td></tr>
<tr><td colspan="3">2.Policy analysis</td></tr>
<tr><td rowspan="5"></td><td colspan="2">1)Consistency and attitude</td></tr>
<tr><td rowspan="2"></td><td>①Consistency with higher plan</td></tr>
<tr><td>②Attitude toward the project</td></tr>
<tr><td colspan="2">2)Project risk</td></tr>
<tr><td rowspan="2"></td><td>①Financial feasibility</td></tr>
<tr><td>②Environmental impact</td></tr>
<tr><td colspan="3">3.Balanced regional development</td></tr>
<tr><td rowspan="2"></td><td colspan="2">1)Regional backwardness</td></tr>
<tr><td colspan="2">2)Regional economic impact</td></tr>
</table>

When the appraisers implement paired comparison, the nine-point scale system, which is well suited to reflect the preferences of the appraiser, is used. As seen in Table 3-11, a transformation from linguistic judgment to numerical score is needed in the use of the nine-point scale system in order to create a relative weighting which falls within the range of 0.1 to 0.9. Let us take the example of a paired comparison between an economic factor and a policy factor in which appraisers are asked to choose between two assessments. If the appraiser has ultimate preference for one assessment factor (e.g. economic), the relative weight of the economic factor is 0.9 and that of the other factor (e.g. policy) is automatically 0.1.

Table 3-11: Nine-point scale system

(Unit: point)

Assessment items	Linguistic judgment	AHP standard point	Relative weight[16]
One factor (i.e. economic factor)	Ultimate preference for	9	0.9
		8	0.89
	Very strongly prefer	7	0.88
		6	0.86
	Strongly prefer	5	0.83
		4	0.80
	Weak preference for	3	0.75
		2	0.67
	Rate equally	1	0.5
The other factor (i.e. policy factor)		1/2	0.37
	Weak preference for	1/3	0.25
		1/4	0.2
	Strongly prefer	1/5	0.17
		1/6	0.14
	Very strongly prefer	1/7	0.12
		1/8	0.11
	Ultimate preference for	1/9	0.1

[16] It means that relative weight for one factor. The relative weight for the other factor (e.g. policy) is automatically decided by equation (relative weight for the other factor = 1- relative weight for one factor).

Let us take the Beulnae Railroad as an example (Table 3-12). As there are three assessments at the first level, pair comparison will be implemented three times at this level: ① comparison between the economic factor and the policy factor, ② comparison between the economic factor and the balanced regional development analysis, ③ comparison between the policy factor and the balanced regional development analysis. On the other hand, as there are two assessment items at Level 2, and 3 in each sub-group, pair comparison will be implemented once for each sub-group at Levels 2 and 3: ① comparison between consistency with a higher level plan and project risk for policy analysis (Level 2), ② comparison between regional backwardness analysis and regional economic impact for balanced regional development analysis (Level 2), ③ comparison between consistency with a higher level plan and attitude toward the project for consistency with a higher level plan (Level 3), and ④ comparison between financial feasibility and environmental impact for project risk (Level 3).

These paired comparisons can be implemented through the nine-point scale system (see Table 3-11). Let us take Appraiser 1 as an example (see Table 3-12). Through three pair comparisons, Appraiser 1 allocates a weighting to three appraisal sub-factors – economic (0.450), policy (0.350) and balanced regional development (0.200) – at Level 1, and the total weight is 1.

Secondly, at the Level 2, the Appraiser makes a paired comparison between 1) consistency and attitude and 2) project risk, in order to allocate the policy weight (0.350) between these two appraisal sub-factors of the policy factor. The result gives consistency and attitude 0.292 and project risk 0.058, which reflects a strong preference

for consistency and attitude (see Table 3-11: 0.292 = 0.350*0.83 (strongly prefer). On the other hand, Appraiser 1 makes a paired comparison between 1) regional backwardness analysis and 2) regional economic impact in order to allocate the weighting for balanced regional development (0.200) between these two appraisal sub-factors of the balanced regional development factor. Regional backwardness analysis receives a weighting of 0.133 and regional economic impact gets 0.067, which results reflect a weak preference for regional backwardness (see Table 3-11): 0.133 = 0.200*0.67 (slightly weak preference for).

At Level 3, Appraiser 1 makes a paired comparison between ① consistency with a higher plan and ② attitude toward the project, in order to allocate the consistency and attitude weighting (0.292) between these two appraisal sub-factors of the consistency and attitude factor. The result gives ① consistency with a higher plan 0.049, and ② attitude toward the project 0.243, which results reflect a strong preference for attitude toward the project (see Table 3-11): 0.243 = 0.292*0.83 (strongly prefer). On the other hand, the Appraiser 1 makes a pair comparison between ① financial feasibility and ② environmental impact in order to allocate the project risk weighting (0.058) between these two appraisal sub-factors of the consistency and attitude factor. The result gives ① financial feasibility 0.051, and ② environmental impact 0.007, which results reflect a very strong preference for financial feasibility (see Table 3-11): 0.051 = 0.058*0.88 (very strongly prefer). After this process of pair comparisons carried out by Appraiser 1 through the nine-point scale system, the final weighting for each assessment item can be obtained through the geometric average of Appraiser's six results for weighting.

Table 3-12: Result for weighting on the Beulnae Railroad

(Unit: point)

Assessment items			Appraisers						
Level 1	Level2	Level3	**total**	***1***	2	3	4	5	6
1. Economic analysis			**0.468**	***0.450***	0.450	0.450	0.450	0.500	0.500
2.Policy analysis			**0.311**	***0.350***	0.300	0.300	0.350	0.270	0.300
	1)Consistency and attitude		**0.248**	***0.292***	0.257	0.240	0.292	0.180	0.225
		①Consistency with higher plan	**0.109**	***0.049***	0.037	0.048	0.219	0.135	0.169
		②Attitude toward the project	**0.139**	***0.243***	0.220	0.192	0.073	0.045	0.056
	2)Project risk		**0.063**	***0.058***	0.043	0.060	0.058	0.090	0.075
		①Financial feasibility	**0.053**	***0.051***	0.037	0.051	0.050	0.068	0.056
		②Environmental impact	**0.011**	***0.007***	0.006	0.009	0.008	0.023	0.019
3.Balanced regional development			**0.221**	***0.200***	0.250	0.250	0.200	0.230	0.200
	1)Regional backwardness analysis		**0.147**	***0.133***	0.167	0.167	0.133	0.153	0.133
	2)Regional economic impact		**0.074**	***0.067***	0.083	0.083	0.067	0.077	0.067

Rationale for giving appraisers discretion on weighting

The weighting process is necessary to create one numeral (the AHP score) through synthesizing the results of the different appraisal sub-factors (KDI 2012). The problem of whether it is better to put the same weighting set on each project, or to put different weighting sets on each project, can be decided by the relative importance of the consistency of appraisal and the specificity of projects. According to the data, as there is significant different character between the projects, it is necessary to put different weighting sets on each project in order to reflect the specific factors of each project (KDI, 2001). On the other hand, as the weighting process involves giving discretionary power to appraisers, it is necessary to put the weighting sets on projects before the

scoring is done, in order to prevent opportunistic behaviour by the appraisers (KDI, 2001). Although, there was no limit for the allocation of weighting on each appraisal factor in the year 2003, when the AHP was introduced, the range of weightings on each appraisal factor has settled down as time has gone on in thus creating more harmony between the consistency of appraisal and the specificity of projects (KDI 2001, KDI 2003, KDI 2005, KDI 2008, KDI 2012). As seen in Table 3-13, although, there was no range of weighting for each appraisal factor until 2004, the guidelines for PRP regulated the range of weighting for each appraisal factor after the year 2005. In particular, the balanced regional development factor was detached from the policy factor in the year 2006 in order to reflect the importance of regional balance.

Table 3-13: Weighting range of AHP

	Appraise factors		
	Economic analysis	Policy analysis	Balanced regional development analysis
’03-‘04	-		
‘05	45-65%	-	
‘06	40-50%	25-35%	15-25%
From‘07	40-50%	25-35%	15-30%

3) Scoring

The scoring process is the process in which the appraiser imposes a score on each assessment item indicating its suitability for implementation. The range of the score is between 0.1 and 0.9, and projects which get 0.5 or more are judged suitable for implementation (see Table 3-14). Like the weighting process, the scoring is carried out using nine-point scale methodology. Like the weighting process, which is implemented by pair comparison between appraisal sub-factors, the scoring process can be

implemented by paired comparison which judges between implementation and the status quo for each appraisal sub-factor. As seen in Table 3-14, the appraiser judges linguistically between a preference for implementation ('recommended') and one for the status quo ('not-recommended') for each appraisal sub-factor. If the appraiser gives their ultimate preference to implementation, the AHP standard point for implementation is 9 (suitability for implementation 0.9) and the AHP standard point for the status quo is automatically 1/9 (suitability for status quo 0.1).

Table 3-14: Nine-point scale system

	Linguistic judgment	AHP standard point	Suitability for implementation[17]
Implementation	Ultimate preference for	9	0.9
		8	0.89
	Very strongly prefer	7	0.88
		6	0.86
	Strongly prefer	5	0.83
		4	0.80
	Weak preference for	3	0.75
		2	0.67
	Rate equally	1	0.5
		1/2	0.37
	Weak no preference for	1/3	0.25
		1/4	0.2
	Strongly not prefer	1/5	0.17
		1/6	0.14
	Very strongly not prefer	1/7	0.12
		1/8	0.11
Status quo	Ultimate no preference for	1/9	0.1

As seen in Table 3-15, the criteria of judgment for each assessment item are composed of qualitative judgment and numerical data. The qualitative judgment deals with consistency, attitude, financial feasibility, and environmental impact; and the numerical

[17] Converted by 'w =1 /(AHP standard point + 1) which was described in Chapter 2

data deal with B/C ratio and the regional backwardness index. Although both qualitative and numerical factors are scored using nine-point scale methodology in a similar way to weighting, the highest score for financial feasibility and environmental effect assessment are set at 1 point (AHP standard point), because most projects are not problematic with regard to these assessment factors. Besides, quantitative factors such as the B/C ratio and the regional development index should be assessed by a standard score (an AHP standard point), in order to prevent the same score for the B/C ratio having different effects on the decision.

Table 3-15: Criteria for judgement on assessment items

Assessment items			Criteria of judgment	implementation
Level 1	Level2	Level3		
1. Economic analysis			B/C ratio	B/C ratio↑ → suitability ↑
2.Policy analysis				
	1)Consistency and attitude			
		①Consistency with a higher plan	Qualitative judgment	Consistency↑ → suitability ↑
		②Attitude toward the project	Qualitative judgment	Positive Attitude↑ → suitability ↑
	2)Project risk			
		①Financial feasibility	Qualitative judgment	No financial problem → AHP standard point 1 (suitability : 0.5)
		②Environmental impact	Qualitative judgment	No environmental problem →AHP standard point 1 (suitability : 0.5)
3.Balanced regional development				
	1)Regional backwardness analysis		Regional backwardness index	Regional backwardness index ↑ → suitability ↑
	2)Regional economic impact		Amount of value added/GRDP, Qualitative judgment	Amount of value added/GRDP↑ → suitability ↑

Let us take the Beulnae Railroad as an example (Table 3-16). Each assessment item can be appraised by the lowest level appraisal sub-factor for it. For this reason, unlike the economic analysis factor, which can be appraised by itself, the policy analysis factor, which is composed of the four lowest appraisal sub-factors – consistency with a higher plan, attitude toward the project, financial feasibility, and environmental impact – can be appraised in terms of these lowest four appraisal sub-factors. Let us take as an example the policy analysis factor, which can be appraised through the subjective opinion of the appraiser. The results for the suitability score are 0.88 (consistency with a higher plan), 0.854 (attitude toward the project), 0.398 (financial feasibility) and 0.414 (environmental impact). Firstly, according to the results (see Tables 3-14 and 3-16), the appraiser has a very strong preference (0.88) for implementation of the project from the point of view of consistency with a higher plan, and a strong preference (0.854) for implementation of project from the point view of attitude toward the project. However, the appraiser has a weak preference (0.398, 0.414) for the status quo (suspend or cancel the project) from the point of view of financial feasibility and environmental impact. Consequently, although the appraiser has a preference for implementing the Beulnae Railroad project from the point of view of consistency with a higher plan and attitude toward the project, he opposes implementation from the point of view of financial feasibility and environmental impact.

Table 3-16: Scoring for the Beulnae Railroad

Assessment items			Suitability score
Total			
Level 1	Level 2	Level 3	
1. Economic analysis			0.403
2.Policy analysis			
	1)Consistency and attitude		
		①Consistency with a higher plan	0.88
		②Attitude toward the project	0.854
	2)Project risk		
		①Financial feasibility	0.398
		②Environmental impact	0.414
3.Balanced regional development			
	1)Regional backwardness analysis		0.229
	2)Regional economic impact		0.714

Scoring for numerical data

Economic analysis and part of balanced regional development analysis can be appraised by numerical data. Compared with qualitative judgements, which can be expressed linguistically, analysis based on numerical data involves the production of specific numbers. As a linguistic judgment is translated into an AHP standard point for qualitative judgement, there is a need to translate numerical data into an AHP standard point for numerical judgment. However, the translation process from an AHP standard point to suitability for implementation (recommendation) is the same for both a qualitative judgment and a numerical judgment.

Let us take economic analysis as an example. Compared to policy analysis and some part of regional factor analysis, which can be expressed as a linguistic judgment, economic analysis can be expressed by numerical data (B/C ratio) instead of a linguistic judgment in qualitative judgement (see Table 3-17).

In order to not only to synthesize for the AHP but also to prevent appraisers who have the same numerical data from using it to make different decisions, each assessment item should be appraised in the same standard unit (as an AHP standard point). Let us take the B/C ratio for example. The formula for this change is as follows.

Formula(1): AHP standard point of B/C = $5.11532 \times \ln(\text{B/C ratio}) + i$

(B/C ratio $\geq 1 \rightarrow i = 1$, B/C ratio $< 1 \rightarrow i = -1$)

Through this formula the B/C ratio (absolute numerical value) can be translated into an AHP standard point. As seen in Table 3-17, through the formula (1) the B/C ratio is changed to an AHP standard point; and then through the process of scoring for suitability, the AHP standard point is translated into economic suitability. If the B/C ratio is more than 2.54, it will be counted as AHP standard point 9 by the formula (1); and if the B/C ratio is less than 0.38, it will be counted as AHP standard point -9 by the formula (1). Let us take Beulnae Railroad as an example. As the B/C ratio for this project is 0.91, the AHP standard point is between 1.0 and -1.91 and economic suitability is between 0.5 and 0.34 (exactly 0.403, see Table 3-17).

Table 3-17: Relationship between B/C ratio and economic suitability

① B/C ratio	② AHP standard point	③Suitability for implementation
Converted by Formula(1)(①→②)		
2.54	9	0.9
2.0	6.69	0.87
1.4	3.89	0.80
1.2	2.57	0.72
1.1	1.82	0.65
1.0	1.0	0.5
0.90	-1.91	0.34
0.80	-2.92	0.26
0.70	-4.06	0.20
0.60	-5.39	0.16
0.50	-6.69	0.13
0.39	-9	0.1

Source from Kwon (2007)

On the other hand, the regional backwardness index can be translated into an AHP standard point by following formula.

Formula(2): AHP standard point of Regional backwardness index = $\alpha + i$

► $\alpha = 0.81220 + 2.23298 \times LIR - 0.29626 \times LIR2 + 0.74302 \times LIR3 + 0.32728 \times MIR2$

$\alpha \geq 0 \rightarrow I = i$, $\alpha < 0 \rightarrow i = -1$

LIR: standard point for regional backwardness of each city

MIR: standard point for egional backwardness of each province

Regional backwardness (LIR, MIR) is calculated by the weighted average of indices which represent the regional backwardness of each city and province. Regional

backwardness can be divided into two categories: the regional backwardness of each city, and the regional backwardness of each province.

LIR, MIR = ∑ standard of each index value in each region × weight on each index

As seen in Table 3-18, regional backwardness is composed of eight indices which are measured individually, translated into standard points, and then translated into average weightings (KDI, 2008).

Table 3-18: measurement and weight on backwardness index

Index	Measurement	Weighting (%)
Growth of population	Average annual increase of population over last 5 years	8.9
Index of aging	(number of over-65 year-olds/number of under-14-year-olds) × 100	4.4
Fiscal self-reliance ratio	(local tax income + non-tax receipts/total revenue of general accounts) × 100 : 3 year average	29.1
Ratio of manufacturing firm workers	(number of manufacturing firm workers/total population) × 100	13.1
Number of cars	(number of cars/total population) × 100	12.4
Street ratio	(total length of roads/size of city) × 100	11.7
Number of doctors per people	(number of doctors/total population) × 100	6.3
Ratio of urban land use	(factory sites + building sites + school sites) / size of city × 100	14.2

According to the guidelines (KDI 2012), there are 16 provinces and 168 cities in South Korea.

4) Synthesizing for the AHP

The process of synthesizing the AHP score involves the aggregation of the results of the multiplication of weighting and suitability scores for each assessment

AHP

$= \sum$ Weighting of each assessment factor × suitability score for assessment factor

Let us take the Beulnae Railroad as an example. The AHP score can be obtained by multiplying the suitability and weighting on each assessment item (Table 3-19).

Table 3-19: Synthesizing in the AHP on the Beulnae Railroad

Assessment items			Weighting[18] (A)	Suitability score[19](B)	AHP (A*B)
Total					**0.508**
Level 1	Level 2	Level 3			
Economic analysis			0.468	0.403	0.189
Policy analysis			0.311		
	Consistency and attitude		0.248		
		Consistency with a higher plan	0.109	0.88	0.089
		Attitude toward the project	0.139	0.854	0.119
	Project risk		0.063		
		Financial feasibility	0.053	0.398	0.021
		Environmental impact	0.011	0.414	0.005
Balanced regional development			0.221		
	Regional backwardness analysis		0.147	0.229	0.034
	Regional economic impact		0.074	0.714	0.053

[18] This can be obtained through the geometric average of the 6 Appraisers' results for weighting.
[19] This can be obtained through the geometric average of the 6 Appraisers' results for scoring.

4. Concluding points

The last stage of the AHP process is the drawing up of a proposal concerning project selection. The AHP score had a direct effect on recommendation policy until the end of 2004.

AHP score ≥ 0.5: project 'recommended' for selection

AHP score < 0.5: project 'not-recommend' for selection

However, there were some problems about deciding what to propose for a project when the score was around 0.5 and the opinions of appraisers differed. In order to solve this problem, the KDI set a gray area near AHP score 0.5. This gray area means that the score may change according to the appraisal group (Table 3-20).

0.45 < Grey area < 0.55

Since the year 2005, this grey area has meant that the AHP score has had different effects on the proposal for a project according to the ratio of decision discordance among the appraisers.

Let us take the Beulnae Railroad as an example. Of the four appraisers left after two out of six were excluded for extreme preferences, three wanted the project launched and one wanted the project suspended. Although, according to guidelines, the conclusion should

have been a little cautious (see Table 3-20), there is no mention of applying a little caution, and only the validity of the project is mentioned in the report on the project.

Table 3-20: Conclusion depends on accordance and the AHP

		AHP			
		AHP<0.45	0.45≤AHP<0.5	0.5≤AHP<0.55	0.55≤AHP
Recommendation of analysts o:×	4:0	-	-	Recommended	Recommended
	3:1	Feedback	**More caution**	**A little caution**	Recommended
	2:2	AHP<0.42: Not-recommended AHP>0.42: little caution	**Caution**	**Caution**	AHP>0.58: recommended AHP>0.58: little caution
	1:3	Not-recommended	**A little caution**	**More caution**	Feedback
	0:4	Not-recommended	Not-recommended	-	-

3.4.2. Does the system actually follow these laws and regulations to the letter?

3.4.2.1. Standard of judgment of policy analysts for weightings on appraisal sub-factors are different from each other

According to the PRP guidelines, policy analysts can set their own weightings for projects within the permitted weighting range for each appraisal sub-factor with no objective standard of judgment for weighting on appraisal sub-factors. For this reason, in this section, we will explore the judgment standards of policy analysts when they take part in the PRP through interviews with policy analysts who have had experience of taking part in PRP. As a result of the interviews, we came up with the following two main findings. Firstly, standards of judgment for weighting sets for appraisal sub-factors can be divided into two main categories: the overall judgements of analysts on projects which are formed during the PRP; and the emphases on specific factors which are decided before the PRP. Table 3-21 shows the standards of judgment for weightings set on appraisal sub-factors. As see in the Table, there are different standards of judgment for weightings on appraisal sub-factors according to the different stakeholders. Eleven out of 17 interviewees who had experience of PRP stated that they set weightings on appraisal sub-factors differently according to their overall judgments on the projects which were formed during the appraisal process. On the other hand, the other six interviewees considered the specific appraisal sub-factors as important, regardless of the project (economic factor: three out of six, policy factor: two out of six, regional factor: one out of six). Secondly, according to the interviews, it may be supposed that, contrary

to KDI analysts and professors who consider the overall judgements of analyst on projects as important, private company analysts consider the emphasis on specific factors before the PRP as important for judgments on the weightings of appraisal sub-factors. As seen from Table, all six KDI analysts stated that they considered the overall judgments on projects which were formed during the PRP to be important indicators for the weightings for each appraisal sub-factor. Four out of six professors also stated that overall judgments on projects which were formed during the PRP were important indicators for the weighting for each appraisal sub-factor, while only two professors considered economic factors to be important indicators as to the weighting for appraisal sub-factors regardless of the projects' characteristics. Contrary to the other two types of policy analyst, who considered overall judgments on projects to be important indicators for determining the weighting for each appraisal sub-factor, relatively, four out of five private company analysts considered specific appraisal sub-factors as important indicators, regardless of the projects' characteristics.

Table 3-21: Judgments standard for weighting sets for appraisal sub-factors

(Unit: Number of persons)

		Policy analysts			
		KDI analysts	Professors	Private company analysts	Total
Overall judgement of analyst on projects		6	4	1	11
Emphasis on specific factors	Economic factor	0	2	1	3
	Policy factor	0	0	2	2
	Regional factor	0	0	1	1
	Sub-total	0	2	4	6
Total		6	6	5	17

3.4.2.2. Policy analysts consider weighting and scoring at the same time

According to the PRP guidelines, the weighting process should be separate from, and carried out in advance of, the scoring process. This separation protects PRP results from the exaggerated amount of discretion wielded by policy analysts, while it can reflect policy analysts' overall judgments on each project's characteristics through the weighting process. However, from the interview results, we found that some policy analysts did consider providing weighting and scoring at the same time in order to reflect their opinion in the final PRP results. From the interview results, we came up with the following two main findings. Firstly, according to the interviews, when analysts make decisions on the weighting after the scoring of appraisal sub-factors, it is possible to have a correlation between the scoring and the weighting for appraisal sub-factors. Table 3-22 shows the results of interviews about considering the scoring and the weighting of appraisal sub-factors at the same time, and not doing so. As see from the Table, six out of eight policy analysts who took part in the PRP stated that analysts make decision on weighting after the B/C ratio has been produced. On the other hand, professors who took part in the PRP on other projects stated that they did not consider both scoring and weighting at the same time.

Table 3-22: Whether or not scoring and weighting are considered at the same time

(Unit: number of person)

	Policy analysts			
	KDI analysts	Professors	Private company analysts	Total
Do not consider both scoring and weighting at the same time	0	2	0	2
Consider scoring and weighting at the same time	3	1	2	6

Secondly, there are two main reasons for the correlation between scoring and weighting for appraisal sub-factors. One main reason is that analysts want their favoured projects to be recommended; and the other main reason is that policy analysts want to reflect the overall judgments which are formed during the PRP. In the interviews, four out of six interviewees stated that analysts wanted to promote their favoured projects and one other interviewee said they wanted to reflect the overall judgments formed during the PRP. One policy analyst, who talked about the reasons for correlation said:

> *As policy analysts may know the score for appraisal sub-factors, some policy analysts manipulate the weighting sets for appraisal sub-factors in order to promote their favoured projects. This may be due to policy analysts having different goals. I think that private company analysts do this kind of thing, and some professors also have this kind of tendency (interviewed 29 Nov 2012).*

3.5. Conclusion

This chapter has presented an overview and analysis of the current Preliminary Feasibility Study and budget allocation processes in South Korea. It has tried to answer three preliminary research questions in order to diagnoses the current system and raise the issues which will be related to the main research questions

First, in Section 2, the historical background and details of the processes' introduction by the MOSF were presented. After this, a framework for the PRP, including Korea's performance management system, was presented through one sample project which was subjected to the PRP. In this section, we raised issues about the current English definition of the Preliminary Feasibility Study, which was given its name by the KDI. The first issue was that the characteristics of 'feasibility' in this study are different from the narrow meaning of feasibility as the possibility of implementation, because the Korean PRP is composed of appraisal of desirability and of feasibility. The second issue is the role of the PRP, and the fact that the meaning of 'overview survey' in the definition of the PRP cannot reflect the role of the PRP as policy recommendation. Considering these issues, we suggested 'Preliminary project Recommendation Process (PRP)' as an alternative definition to 'Preliminary Feasibility Study'.

Secondly, in Section 3, we analysed documentary and interview results to answer the first and the related third sub-research questions (What the requirements are for new projects to get budget approval and to have an annual budget released, according to the laws and regulations. And, whether the system actually follows these laws and regulations to the letter). In this section, we found that some 'not-recommended'

projects were selected for budget approval (BS), even though this was ruled out by the guidelines. Furthermore we also found that AHP scores themselves might affect the BP, which was not mentioned in the guidelines. The details of these differences between the law and actual practice will be analyzed in Chapter 5.

Lastly, in Section 4, we analysed documentary evidence and interview results to answer the first and related third sub-research questions (How the scoring and weighting systems work, in combination with other practices and factors, to determine PRP results. And whether the system actually follows these laws and regulations to the letter). In this section, we found that policy analysts considered scores and weightings at the same time, which was different from the guidelines, which divided these processes. Furthermore, we also found that the standards of judgments of policy analysts for weighting on appraisal sub-factors were different from each other and these analysts had discretionary powers within the range permitted by the guidelines.

From these results, we have questioned the effects of these discretionary powers of policy analysts on RBS decisions and the behaviour of policy analysts when they take part in the PRP. The details of these questions will be analyzed in Chapters 6 and 7.

The next chapter presents the conceptual and methodological framework used in the research for analysing the main research question.

CHAPTER 4 RESEARCH METHODOLOGY

4.1. Introduction

This chapter explores the design, processes and methodological issues of this study. It is composed of four parts:

- developing the research questions
- outlining a methodological and conceptual framework for each research question
- devising specific research designs for each research question.

The first section presents the research questions which have been developed from the literature review of previous research and an overview of the Korean PRP. Some research questions are composed of both quantitative and qualitative research sub-questions, in order to provide a comprehensive analysis of the research problem. The following section presents the methodological framework for this study, which is composed of a mixed methodology strategy and a conceptual framework. As there are both quantitative and qualitative research questions in this study, mixed research methods are adopted to provide an in-depth analysis of these questions. The conceptual framework for the study has been set through considering the research questions which have been developed from the literature review. After this, a specific research design for each research question is outlined. Cross-sectional and longitudinal studies can be adopted to analyse the quantitative research questions. On the other hand, a case study methodology is adopted to explore the qualitative research questions. Each research design section addresses the issues of timing, grouping, collecting data and analysing data parts.

4.2. Developing research questions

As seen from Chapter 1, the five research objectives of this study are as follows: to explain the impact of PRP results on budgetary decisions; to examine the appropriateness of using current PRP methodology to produce PRP results; to suggest alternatives to current PRP methodology; to examine the types of, extent of, and reasons for non-neutral behaviour of stakeholders in the PRP; and to suggest alternative strategies for reducing this non-neutral behaviour.

These research objectives will be addressed through three main research questions and one preliminary research question. The preliminary question, which provides a diagnosis and raises the issues of the current Korean PRP and the budget system, was analyzed in Chapter 3, whilst in this chapter, the three main research questions, which contain the suggested definition (PRP) for PFS, are identified in order to address the research objectives. These main questions are as follows.

① ***Research Question 1: What is the impact of PRP results on BS and BP decisions (controlling for other factors)?***

①-1. What is the impact of PRP results on BS decisions (with controlling for other factors)?

①-2. What is the impact of PRP results on BP decisions (with controlling for other factors)?

② ***Research Question 2: Does the current PRP methodology lead to inappropriate decisions, from the perspective of different stakeholders, on the set of projects which are recommended for selection?***

②-1. What are the effects of the current PRP methodology on RBS decisions?

②-2. What are the views of stakeholders in the PRP on whether the current PRP methodology leads to appropriate RBS decisions – and what are the reasons for these views?

②-3. What would be the effect of possible alternative PRP methodologies on RBS decisions?

②-4. How desirable do different stakeholders think these alternative PRP methodologies would be?

③ ***Research Question 3: What are the types of, extent of, and reasons for non-neutral behaviour of stakeholders in the PRP and how might this be reduced?***

③-1. What are the types of, and extent of, non-neutral behaviour by each stakeholder occurring in the PRP?

③-2. What are the reasons for the non-neutral behaviour of stakeholders observed in the PRP?

③-3. How might those types of non-neutral behaviour which are not desired by MOSF be reduced?

4.3. Methodological framework

4.3.1. Mixed methods research as a research strategy

Creswell (2009) argues that there are three types of research approach: qualitative, quantitative and mixed methods designs. In this study, in response to the different types of research question, we concluded that concurrent mixed methods of research could be adopted to provide a comprehensive analysis. The detailed strategies of each approach are as follows.

Quantitative strategies

Quantitative approaches are appropriate to activities such as the identification of factors that influence an outcome and the testing of a theory or explanation (Creswell 2009, Kim 2011). Quantitative research employs strategies of inquiry such as experiments, surveys, investigations of previously collected data, and structured observation (Bryman 2003, Kim 2011). In particular, survey research provides a quantitative or numeric description of trends, attitudes, or the opinions of a population, by studying a sample of that population. It includes cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection, with the intent of generalizing from a sample to a population (Creswell, 2009).

Qualitative strategies

Qualitative approaches are appropriate for eliciting the meanings behind participants' views on a problem or issue. Strategies associated with a qualitative approach can be

divided into five categories: narrative research, phenomenology, grounded theory, ethnography, and case studies (Creswell 2009). Case studies in particular are 'a strategy of inquiry in which the researcher explores in depth a program, event, activity, process, or one or more individuals' (Creswell 2009,p.13).

Mixed methods research as a research strategy for this study

As all methods have limitations, some researchers have argued that the biases inherent in any single method can neutralize or cancel out the biases of other methods (Creswell 2009). Strategies associated with a mixed methods approach can be divided into three categories: sequential mixed methods, concurrent mixed methods, and transformative mixed methods. In particular, concurrent mixed methods procedures are 'those in which the researcher converges or merges quantitative and qualitative data in order to provide a comprehensive analysis of the research problem' (Creswell 2009,p.14).

Having assessed the range of potential research strategies and corresponding types of research questions for this study, we concluded that concurrent mixed methods research could be adopted to provide a comprehensive analysis of the research problem in the study. As shown in Table 4-1, each research problem can be analysed and explored through quantitative or qualitative approaches, or both, according to the different types of questions studied.

Table 4-1: Research questions and research strategies

	Strategies		
	Quantitative		Qualitative
	Cross-sectional studies	Longitudinal studies	Case studies
① Research Question 1: ***What is the impact of PRP results on BS and BP decisions (controlling for other factors)?***			
①-1 What is the impact of PRP results on BS decisions (controlling for other factors)?	**Y** (employ strategy)		
①-2 What is the impact of PRP results on BP decisions (controlling for other factors)?		**Y**	
② Research Question 2: ***Does the current PRP methodology lead to inappropriate decisions from the perspective of different stakeholders in the set of projects which are recommended for selection)?***			
②-1 What are the effects of the current PRP methodology on RBS decisions?	**Y**		
②-2 What are the views of stakeholders in the PRP on whether current PRP methodology leads to appropriate RBS – and what are the reasons for these views?			**Y**
②-3 What would be the effect of possible alternative PRP methodologies on RBS decisions?	**Y**		
②-4. How desirable do different stakeholders think these alternative PRP methodologies would be?			**Y**
③ Research Question 3: ***What are the types of, extent of, and reasons for non-neutral behaviour of stakeholders in the PRP and how might these be reduced?***			
③-1 What are the types of and extent of non-neutral behaviour by each stakeholder occurring in the PRP?			**Y**
③-2 What are the reasons for the observed non-neutral behaviour of stakeholders in the PRP?			**Y**
③-3. How might those types of non-neutral behaviour which are not desired by the MOSF be reduced?			**Y**

4.3.2. The conceptual framework

In order to explore the impact of the Korean PRP on project selection and budget release in relation to large-scale projects, a conceptual framework was derived from the literature review and interview results. The framework is composed of three stages: the impact of PRP results on budgetary decisions (BS, BP); and the impact of PRP methodology on PRP results; and the impact of behaviour of each stakeholder on PRP results (See figure4- 4).

1) ***The process of making decisions on BS and BP in relation to large-scale projects***

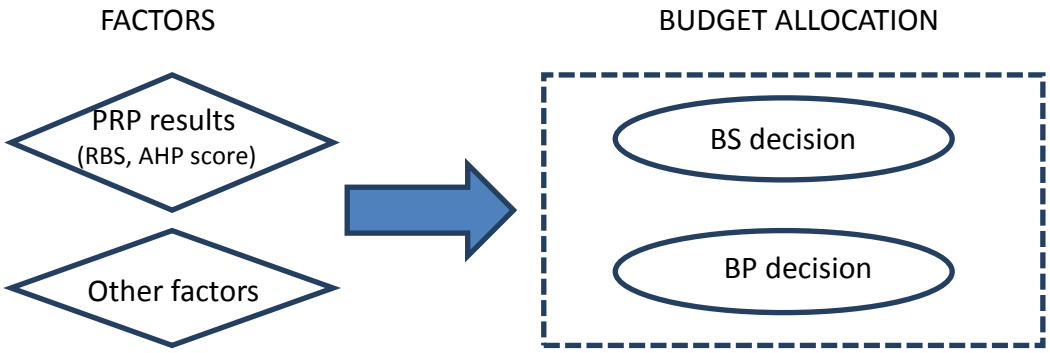
Conceptual framework for Research Question 1 (What are the impacts of PRP results on BS and BP decisions (controlling for other factors)?)

Research Question 1 is about the impact of PRP results on BS and BP decisions in relation to large-scale projects. According to previous research and the preliminary analysis, the factors which might affect budgetary decisions can be classified into two categories: PRP results; and the other factors. PRP results can be divided into: AHP scores; and RBS decisions which are decided by AHP scores[20] (KDI 2008). On the other hand, considering interview results and Jung (2012), the other factors can be classified into three categories: political/policy-related factors, budget constraint-related factors and project-characteristic-related factors. When it comes to the types of budgetary decision, according to the annual guidance for budget requests (MOSF 2012) budgetary decisions should be divided into two types: BS decisions for new projects;

[20] If its AHP score is more than or equal to 0.5, a projects should be recommended for selection; if it isn't, the project should be appraisal as 'not recommended for selection'.

and BP decisions for on-going projects (see Chapter 3). For these reasons, the relationship between PRP results and budget allocation can be described as follows (See Figure 4-1),

Figure 4-1: Relationship between PRP results and budget allocation



Source: Adapted from the guidelines for budgeting (MOSF, 2010)

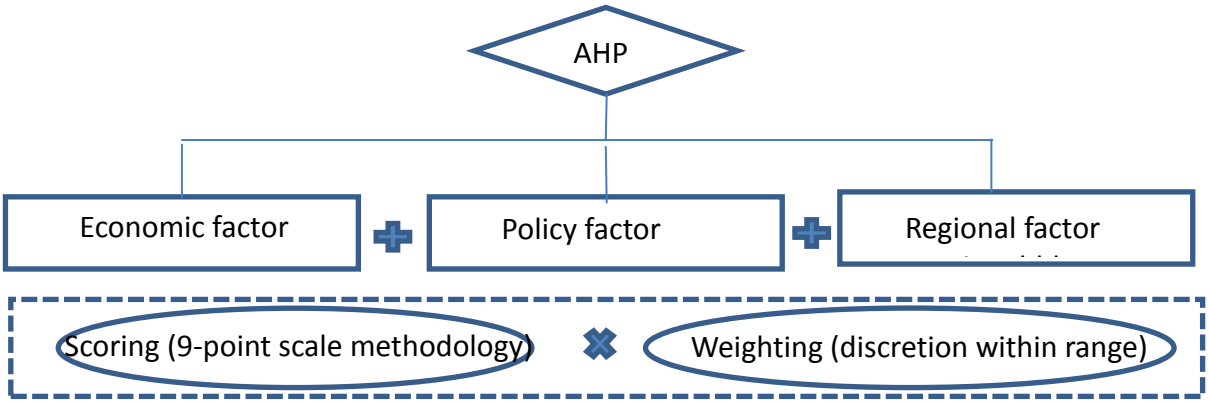
2) ***The impact of current PRP methodology on RBS decisions***

Conceptual framework for Research Question 2 (Does the current PRP methodology lead to inappropriate decisions from the perspective of different stakeholders in the set of projects which are recommended for selection?)

Research Question 2 is about the appropriateness of using the current PRP methodology. The methodology which is used for producing the AHP score in a project's PRP can be divided into two elements: scale methodology and weighting methodology. In the current scale methodology, a nine-point scale is adopted, to convert the judgments of policy analysts' or the B/C ratio into a standard score for calculating the AHP score. The current weighting methodology allows policy analysts to set different weightings for each project, within the range permitted for each sub-appraisal factor, according to their own subjective judgment of what is relevant for the project. For these reasons, the

relationship between PRP results and the current PRP methodology can be described as follows (See figure 4-2). As can be seen from Figure 4-2, the AHP score can be calculated by adding together the weighted standard scores of three sub-appraisal factors. These weighted standard scores are calculated through multiplying the score and weights on each sub-appraisal factor which have been derived from the nine-point scale and the current weighting methodology.

Figure 4-2: A conceptual framework for the methodology used to obtain PRP results



Source: Adapted from the guidelines for PRP (KDI, 2010)

3) ***Non-neutral behaviour of each stakeholder and the reasons for this***

Conceptual framework for Research Question 3 (What are the types of, extent of, and reasons for, the non-neutral behaviour of stakeholders in the PRP process and how might this behaviour be reduced?)

Research Question 3 is about the non-neutral behaviour of stakeholders in the PRP process and the reasons for these. Stakeholders can be divided into three types: spenders (local government officials, agency officials and line-ministry officials), policy analysts (KDI analyst, professors and private company analysts), and MOSF officials (KDI, 2010).

As for the behaviour of stakeholders, in contrast to the view that considers policy analysts as technocrats and value-neutral experts, most previous research argues that policy analysts take part in the policy process with their own specific value chains (Meltsner 1976, MacCoun 1998, Weimer and Vining 2005, Ko 2007, Flyvbjerg 2009, Boardman, Greenberg et al. 2010) – in other words, policy analysts exhibit non-neutral behaviour

As discussed in Chapter 2, policy analysts can be divided into three types: the objective technician, the client's advocate, and the issue advocate, according to the values they consider paramount (Weimer and Vining 2005). Furthermore, according to Boardman, Greenberg et al. (2010), stakeholders are likely to take part in the PRP using their own bureaucratic and political lenses, namely the 'constituency-support' lens (spenders), the 'project-support' lens, showing their projects at its best in the PRP (spenders) and the 'skeptical' lens, with a natural tendency to consider CBA as naïve (the MOSF).

MacCoun (1998) argues that types of bias in the interpretation of empirical research findings can be divided into four, according to their intentionality, motivation and normative justifiability: fraud (intentional, motivated effort to manipulate, conceal, or misinterpret evidence), advocacy (intentional, motivated effort to selectively use and place emphasis on evidence), cold bias (unintentional, unmotivated biased evidence processing), and hot bias (unintentional, motivated biased evidence processing)**,**. Furthermore Flyvbjerg (2009) raises the issue that ex ante estimates of costs and benefits are often very different from actual ex post costs and benefits, because large-

scale infrastructure projects typically exhibit cost overruns, benefit shortfalls, and the systematic underestimation of risk. Flyvbjerg (2009) also presents three types of explanation to account for cost overruns and benefit shortfalls in major infrastructure projects: technical, psychological and political-economic.

These previous research studies suggest that diverse non-neutral behaviours are exhibited by stakeholders who take part in the PRP process. From these previous studies, we developed a model for analysis of the non-neutral behaviour of stakeholders.

Firstly, non-neutral behaviours can be divided into two categories – intended and unintended – in line with the approach of MacCoun (1998), who divided the types of biased evidence processing into four according to their intentionality and motivation. In this study, 'intentionality' refers to the combination of consciousness and controllability. A non-neutral behaviour is intentional when the person making the judgment is aware of their bias and chooses to express it when they could avoid doing so (MacCoun 1998). MacCoun's research focused on policy analysts, so the non-neutral behaviour of spenders and MOSF officials were excluded from his model. In this study, I have extended his approach by classifying the non-neutral behaviour of both spenders and MOSF officials into intended and unintended behaviours.

Secondly, non-neutral behaviours can be also divided into two categories according to the direction of their tendency[21]: over-stating the AHP score and under-stating the AHP score.

[21] The one of main question of this study is about the non-neutral behaviour of each stakeholder. In PRP However, the terminology 'bias' can be defined as 'a term which refers to how far the

According to Kerr, MacCoun et al. (1996), in social psychology, tendency can be defined in terms of two failures of logic: firstly, a tendency is established by showing that someone making a judgment is 'using a bad cue' – i.e. overutilizing a cue relative to normative standards. Secondly, a tendency is established by demonstrating that someone making a judgment is 'missing a good cue' – i.e. underutilizing a cue relative to normative standards. From these definitions, over-stating an AHP score can result from a tendency in the eye of the beholder whose personal prejudices and interests affect their judgment so that they use a good cue or miss a bad cue in deciding the AHP score. On the other hand, under-stating an AHP score can result from a tendency in the eye of the beholder whose personal prejudices and interests affect their judgment so that they use a bad cue or miss a good cue in deciding the AHP score.

It appears that most previous research has not explored the direction of tendency in non-neutral behaviour. Although Flyvbjerg (2009) analyzed the tendency to optimism on the part of policy analysts, leading to 'cost overruns and benefit shortfalls', he did not mention the opposite tendency to pessimism. Thus, this study is ground-breaking in classifying the non-neutral behaviours of both stakeholders who overestimated and stakeholders who underestimated AHP scores. In this study, I will give the label 'tendency' to both types of non-neutral behaviour, taking 'tendency' to be 'tendency in the eye of the beholder'. Specifically, tendency is the inclination for the observers to let

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average statistic lies from the parameter it is estimating, that is, the error which arises when estimating a quantity' statistically (Easton and McColl 1997) and it can be used for overall effect of behaviour. For these reasons, it cannot reflect the non-neutral behaviour of each stakeholder exactly. Thus we decided to use 'tendency' which can be defined as 'an inclination towards a particular characteristic or type of behaviour' for expressing the non-neutral behaviour of stakeholder and reserve the 'bias' for overall effect of non-neutral effect of stakeholders' non-neutral behaviour on the projects.

their personal prejudices and interests influence their interpretation of scientific evidence (MacCoun 1998).

Consequently, non-neutral behaviours on the part of each stakeholder can be divided into four types according to their intentionality and the direction of their tendency (see Table 4-2).

Table 4-2: Non-neutral behaviour according to intentionality and tendency

		Tendency	
		Over-stating AHP score	**Under-stating AHP score**
Intentionality	**Intended**	**Promoter (Type 1)**	**Blocker (Type 2)**
	Unintended	**Dr. Pangloss (Type 3)**	**Cassandra (Type 4)**

Firstly, Promoter behaviour (Type1) in stakeholders can be characterized as intended non-neutral behaviour with a tendency towards over-stating the AHP scores of projects. This type of stakeholder is likely to use and emphasize evidence selectively to promote projects for selection (MacCoun 1998). Secondly, Blocker behaviour (Type2) can be characterized as intended non-neutral behaviour with a tendency towards under-stating the AHP scores of projects. This type of stakeholder is likely to use and emphasize evidence selectively to prevent projects from being selected (MacCoun 1998). Thirdly, Dr. Pangloss[22] behaviour (Type3) can be characterized as unintended non-neutral behaviour with a tendency towards over-stating the AHP scores of projects in order to promote their selection. Here, stakeholders exhibit an optimism tendency, that is a tendency that causes a person to believe that they are less at risk of experiencing a negative event compared to others (Shepperd, Carroll et al. 2002). This kind of

[22] A person who views a situation with unwarranted optimism, after Dr Pangloss, a character in Voltaire's *Candide* (1759).

stakeholder is likely to underestimate the level of costs and to overestimate benefits (Flyvbjerg 2009). Furthermore this optimism tendency is not only unintended but also unconscious (MacCoun 1998, Sutton 1999, Flyvbjerg 2009). Lastly, Cassandra[23] behaviour (Type 4) can be characterized as unintended non-neutral behaviour with a tendency towards under-stating the AHP scores of projects. Here, stakeholders exhibit a pessimism tendency, that is a tendency which causes people to exaggerate the likelihood that negative things will happen to them. This kind of stakeholder is likely to overestimate costs and underestimate benefits (Sutton 1999). Furthermore this pessimism tendency is not only unintended but also unconscious (MacCoun 1998, Sutton 1999).

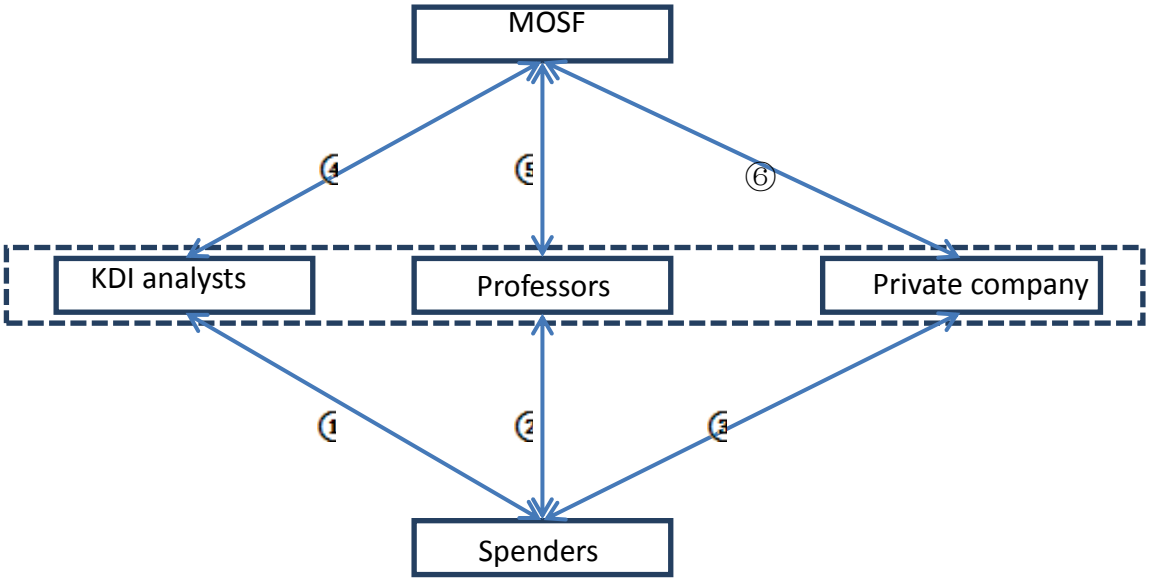
It is important to consider how these non-neutral behaviours can appear and persist in the PRP. According to previous research, the results of the PRP are affected by the relationships among stakeholders, since they have different goals and information levels. These can be analysed from the perspectives of multiple-tier relationships and multiple principal-agent relationships.' (Waterman and Meier 1998, Dixit 2002).

Firstly, the relationships among stakeholders in the PRP can be defined as 'multiple-tier' and 'multiple' principal-agent relationships, because policy analysts (who include KDI analysts, professors and private company analysts) not only serve as agents of the MOSF by providing AHP scores in the PRP system but also act as principals in dealing with spenders, because policy analysts need the basic information and project plan for

[23] (In Greek myth) a daughter of Priam and Hecuba, endowed with prophetic powers, but fated never to be believed. a person who prophesies doom or disaster.

implementing a PRP, but they cannot provide these themselves due to lack of information about the projects, while spenders can provide these due to their expertise on the projects. Figure 4-2 shows the relationships among stakeholders in the PRP, according to the KDI (2008) and Dixit (2002). The policy analysts' role as the intermediate tier can be seen to mitigate the information asymmetry between the top-level principal (MOSF) and the lower level agents (spenders). Furthermore, as the PRP results sum up each policy analyst's independent decision (KDI 2010), it can be supposed that policy analysts act as both quasi-multiple principals to spenders and multiple agents to the MOSF[24] (see Figure 4-3).

Figure 4-3: 'Multiple-tier' and 'multiple' principal-agent relationships in the PRP



Source: Adapted from the guidelines for PRP (KDI, 2010)

Secondly, the reasons for each stakeholder's behaviour can be explored through their relationships with other stakeholders (Waterman and Meier 1998). Considering the

[24] The role of policy analysts in PRP will be discussed in Chapter 8.

relationships among the multiple principals and multiple agents in the PRP (see Table 4-2), we suggest_eight possible types of relationships exist, according to the principals' and agents' goal conflicts and information levels. The relationship for exploring the reasons for non-neutral behaviour in the PRP among stakeholders in the PRP will be selected from these eight possible relationships, according to their goal conflicts and information levels, in Chapter 7.

Table 4-3: Relationships among principals and agents according to goal conflicts and information levels

Goal conflict		Agent's information level	
		Low	High
Principal's information level	High	Type 4: Patronage system	Type3: Advocacy coalition
	Low	Type1: Bumper sticker politics	Type2: Principal-agent

Goal consensus		Agent's information level	
		Low	High
Principal's information level	High	Type 8: Plato's republic	Type7: Policy subsystems
	Low	Type5: Theocracy	Type 6: Bottom line

Source: Adapted from Waterman (1998)

Type 1: Bumper sticker politics

This situation occurs when both principal (the MOSF, policy analysts) and agent (policy analysts, spenders) have little information, within an overall context of goal conflict between them. In such a situation, agents will not be trusted and will really have little productive role to play. Principals will remain active in implementation, with agents performing the role of clerk. In this relationship, agents cannot behave in a non-neutral way if this goes against their principal's interests.

Type 2: Principal-agent

This situation occurs when the principal (the MOSF or policy analysts) has little information but the agent (policy analysts or spenders) has plenty of information, within a context of goal conflict between them. In such a situation, as the goals between principle and agent are different and the principal cannot observe the agent's behaviour, agents behave in a non-neutral way, even though this goes against the principal's interest.

Type 3: Advocacy coalition

This situation occurs when both principal (the MOSF or policy analysts) and agent (policy analysts or spenders) have plenty of information but there are goal conflicts between them. In such a situation, the agents will have the classic principal-agent relationship with some principals whose goals conflict with theirs and a cooperative relationship with others whose goals match theirs.

Type 4: Patronage system

This situation occurs when the principal (the MOSF or policy analysts) has plenty of information and the agent (policy analysts or spenders) has little information, in a situation where there are goal conflicts between them. The agent will act essentially as personal staff to the principal. For this reason, in this relationship, the agent cannot behave in a non-neutral way if this goes against the principal's interests.

Type 5: Theocracy

This situation occurs when both the principal (the MOSF or policy analysts) and the agent (policy analysts or spenders) have little information, in a situation where there is goal consensus between them. In this situation, as agents become advocates – or to put it more harshly, cheerleaders – for the principal's proposed solutions, the agent can behave in a non-neutral way if the principle wants them to do it to promote their interests.

Type 6: Bottom line

This situation occurs when the principal (the MOSF or policy analysts) has little information but the agent (policy analysts or spenders) has plenty, in an overall context of goal consensus between them. In this situation, as the agent is assigned a task with a clear goal and then simply left alone, as long as no major disasters occur, the agent can behave in a non-neutral way if the principle wants them to do this to promote their interests.

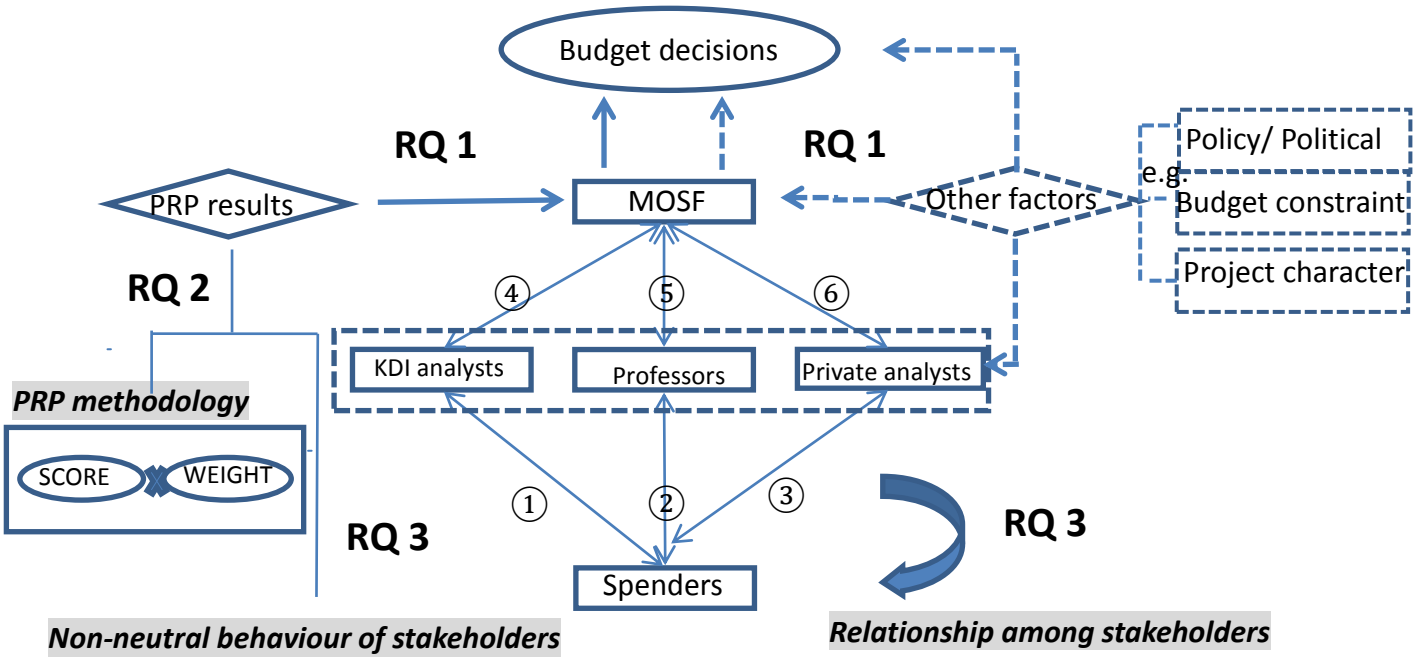
Type7: Policy subsystems

This situation occurs when both the principal (MOSF or policy analysts) and the agent (policy analysts or spenders) have plenty of information, in an overall context of goal consensus between them. In this situation, as the agent will share goals with the principal, and discretion will be granted to the agent as a result of trust, the agent can behave in a non-neutral way if the principle wants them to do this to promote their interests.

Type 8: Plato's republic

This situation occurs when the principal (the MOSF or policy analysts) has plenty of information but the agent (policy analysts or spenders) has little, in an overall context of goal consensus between them. In this situation, as the agent has limited discretion and simply carries out the policy established by the principal, the agent cannot behave in a non-neutral way if this goes against the principal's interest.

Figure 4-4: A Conceptual framework for analysis



		Tendency	
		Over-stating AHP score	Under-stating AHP score
Intentionality	Intended	Type 1 Promoter	Type 2 Blocker
	Un intended	Type 3 Dr. Pangloss	Type 4 Cassandra

RQ 3

Goal consensus		Agent's information level	
		Low	High
Principal's information level	Much	Type 8: Plato's republic	Type7: Policy subsystems ②, ③
	Little	Type5: Theocracy	Type 6: Bottom line ④, ⑤

Goal conflict		Agent's information level	
		Low	High
Principal's information level	Much	Type 4: Patronage system	Type3: Advocacy coalitions ①, ②
	Little	Type1: Bumper sticker politics	Type2: Principal agent ⑤, ⑥

Research questions and methods for the research	Research strategy		
	Quantitative		Qualitative
	Cross-sectional studies	Longitudinal studies	Case studies
R Q 1: What is the impact of PRP results on BS and BP decisions (controlling for other factors)?	**Y**	**Y**	
R Q 2: Does the current PRP methodology lead to inappropriate decisions from the perspective of different stakeholders in the set of projects which are recommended for selection?	**Y**		**Y**
R Q 3: What are the types of, extent of, and reasons for non-neutral behaviour by stakeholders in the PRP, and how might these be reduced?			**Y**

4.4. Quantitative Approaches

Quantitative approaches are appropriate to identify the factors which influence an outcome or test a theory or explanation for a relationship (Creswell, 2009), and to answer research sub-questions related to these. Quantitative approaches include cross-sectional studies and longitudinal studies. As seen in Table 4-1, the research sub-questions which can be analysed through quantitative approaches include:

①-1. What is the impact of PRP results on BS decisions (with controlling for other factors)?

①-2. What is the impact of PRP results on BP decisions (with controlling for other factors)?

②-1. What is the effect of the current PRP methodology on RBS decisions?

②-3. What would be the effect of possible alternative PRP methodologies on RBS decisions?

4.4.1. Cross-sectional studies

A cross-sectional research design collects all the data for associated variables at a single point in time as a snapshot (O'Sullivan, Rassel et al. 2008). It has three distinctive features: no time dimension, dependence on differences which already exist, and groups based on existing differences. For these reasons, it can be more cost-effective to collect data for this than for other designs, and a cross-sectional research design is suitable for

descriptive analysis (De Vaus 2001). This approach is suitable for addressing the research questions below, since it is very useful for descriptive work, particularly for answering 'what' questions. Furthermore, the data can be applied to existing groups (BS project or not, 'recommended project' or 'not-recommended project') which are based on existing differences.

①-1. What is the impact of PRP results on BS decisions (controlling for other factors)?

②-1. What are the effects of the current PRP methodology on RBS decisions?

②-3. What would be the effect of possible alternative PRP methodologies on RBS decisions?

In undertaking a cross-sectional approach this study will determine the groups; collect the data at a single point in time (the end of 2010); divide the collected data between the groups; and analyse the data to answer the research questions.

Timing: no time dimension

This design collects data at a single point in time, because its main focus is to find out existing differences, such as those in budget allocation, and the factors which affect these, such as AHP scores and RBS decisions. Furthermore, in this context this design would be also useful to identify the differences in RBS decisions and the factors which affect these, such as scores and weightings on sub-appraisal factors. Considering the data distribution in each group and the time period from the PRP to budgeting, the end of the year 2010 was a suitable single point in time for this analysis. For example,

certain projects which were subject to the PRP had their PRP results at the end of 2010, and the budget process for the fiscal year 2012 was implemented from early 2011 based on these PRP results. Furthermore it is important to recognise that we did not have the budget allocation data after 2013 because the analysis for this study was done between 2012 and 2013. Thus, considering the PRP, the budget allocation, and the data limitations, the end of the year 2010 was a suitable single point in time for this analysis.

Grouping and collecting data

Groupings in the cross-sectional design are based on existing differences, so there can be no random allocation to groups (De Vaus 2001). As seen in Table 4-4, groupings allow two different types of groups for analysis, such as BS decisions ('Budget Selected projects' or 'Budget Rejected projects'), and RBS decisions ('Recommended projects' or 'Not-recommended projects').

Table 4-4: Types of groups according to the research questions

Research questions	Groups
①-1 What is the impact of PRP results on BS decisions (controlling for other factors)?	2 groups : 1) Budget Selected projects, 2) Budget Rejected projects
②-1 What are the effects of the current PRP methodology on RBS decisions?	2 groups : 1) Recommended projects, 2) Not-recommended projects
②-3 What would be the effect of possible alternative PRP methodologies on RBS decisions?	2 groups : 1) Recommended projects, 2) Not-recommended projects

When it comes to collecting data, there are several methods in cross-sectional design, such as questionnaire survey, archival records, face-to-face interview and telephone interview (De Vaus 2001, Namgung 2011). In this study we used archival records such as computer files, and survey data. As many archival records are produced for specific purposes and their coverage may therefore be partial, using archival records requires a cautious approach (Yin 2008).

In this study, the projects which would be the object of data collection were selected at a single point in time (end of 2010). The secondary data used would include the PRP report for every project which had been subjected to the PRP during 1999 and 2010, except R&D projects, which had been subjected to the PRP since 2008, had different PRP methodology from other projects, and were managed by a different government institution (the KISTEP[25]) from the KDI. Also included would be all the budgets finalized for non-R&D projects in 2010, and the results of the PRP (AHP score, RBS decision, score and weight for each assessment item).

Analysing data

Research questions of the type chosen for the study could be analyzed through SPSS programs, as follows.

①-1 The impact of PRP results on BS decisions on new projects could be analyzed by regression between the independent variable (RBS decisions) and dependent variables (BS decisions). The detailed regression model for analysis will be explained in Chapter 5.

[25] Korean Institute of Science and Technology Evaluation and Planning

②-1 The impact of current PRP methodology on RBS decisions could be analysed by comparing this methodology with methodology in which there were no discretization problems and no discretion power of policy analysts on weighting. The detailed model for analysis will be explained in Chapter 6.

②-3 The impact of alternative PRP methodologies on RBS decisions could be analysed by comparing alternative methodologies with current PRP methodology. The detailed model for analysis will be explained in Chapter 6.

4.4.2. The longitudinal study

Longitudinal design involves an analysis which compares data from different periods (Ruspini 2000). This design has four purposes: describing patterns of change and stability, establishing temporal order, establishing developmental effects, and establishing historical effects (De Vaus 2001). One of our research questions, ①-2, covered changes in budget release over time, so longitudinal analysis was ideal for analyzing this research question:

①-2 What is the impact of PRP results on BP decisions (controlling for other factors)?

The longitudinal design adopted in this study would relate PRP results (AHP scores) to subsequent decisions on budget release over the following years (BP).

The research question answered by this design would be as follows:

What impact do PRP results (AHP scores) have on the BP (Research Question ①-2)? This could be analyzed by regressing the AHP score against the accumulated budget release on on-going projects in each project year, such as mid-year (mid-term) and final-year (long-term).

Period: between 2004 and 2012

This research design collects data over time, because its main focus in this study would be to find out the differences in budget release over time, and how this varied in relation to the PRP results.

The study started with the adoption of the AHP score as part of the PRP system from 2003 onwards. Data on PRP scores was collected from 2003 onwards, when AHP scores were included in the PRP; and data on budget release was collected from 2004 onwards, allowing a one-year time gap. The study covers the eight-year period between 2004 and 2012.

Number of waves and gap between waves

When it came to the number of waves to cover in analysing the effect of PRP results (AHP scores) on BP, the number of waves and the gap between them was dependent on the purpose of the research (De Vaus, 2001). As the purpose of this research was analysis of the impact of PRP results (AHP scores) on BP decisions, every fiscal year could be considered as one wave. However, it is important to recognise that the

minimum planned period for large-scale projects is two budget years and the range of planned periods is from two to seven budget years, according to the budget request guidelines. Thus, if we set different numbers of waves according to different planned project lengths, it might be difficult to compare the impact of PRP on different projects; and if we set more than two numbers of waves, some data, especially that for two year projects, should be excluded. Let us take two projects which had different planned project lengths (one: two years, the other: six years) as examples. If we set different numbers of waves according to the different planned projects lengths, as the two-year project has two waves and the six-year project has six waves, we cannot compare these two projects in same waves. For this reason, the number of waves should be same for each project in order to compare different projects. However, if the number of waves exceeds two, the two-year project is excluded, because it only has two waves. For this reason, two waves for each project, such as a mid-term wave and a long-term one, might be set in order to analyse the impact of PRP on budget allocation over time, with minimization of data loss. The mid-term year and the long-term year can be expressed in the following equations.

Mid-term year = middle year of planned project year (n) / 2
Long-term year = last year of planned project year (n)

Collecting data

The collecting of data for a longitudinal study is similar to the collecting of data for a cross-sectional study.

Operationalization of variables

We used the dependent variable (BP) to represent 'time profile of accumulated budget release on large-scale projects'. The actual variable used was the accumulated ratio of the annual budget which was released for large-scales projects over time, as confirmed by the National Assembly. A further 10 independent and control variables to be operationalized will be discussed in Chapter 5.

Analysing data

The impact of PRP results (AHP scores) on BP decisions (Research question①-2) was analyzed through a regression model. The detailed regression model for analysis will be explained in Chapter 5.

4.5. Qualitative Approach

A qualitative approach is appropriate for focusing on the meanings that the participants give to a problem or issue (Creswell 2009). In this study, since some research sub-questions involved exploring in depth the views of participants in the PRP on how the current methodology works and whether alternative methodologies might be more desirable, a qualitative approach was appropriate. As seen in Table 4-1, the sub research questions which could be analysed through qualitative approach are as follows.

②-2. What are views of stakeholders in the PRP on whether the current PRP methodology leads to appropriate RBS? What are the reasons for these views?

②-4. How desirable do different stakeholders think alternative PRP methodologies would be?

③-1. What are the types of, and the extent of, non-neutral behaviour by each stakeholder that occur in the PRP?

③-2. What are the reasons for the observed non-neutral behaviour of stakeholders in the PRP?

③-3. How might types of non-neutral behaviour which are not desired by the MOSF be reduced?

4.5.1. The Selection and introduction of the case studies

Multiple case studies as a research strategy

This study selected case studies as a research strategy because they could be expected to give the researcher an holistic and meaningful understanding of the complex behaviours identified (de Vaus, 2001) – behaviours exhibited by spenders, policy analysts and the MOSF in determining RBS decisions and budgetary decisions for large-scale projects. The study focused on two case studies – transportation projects and others – chosen from 16 possible choices in which the RBS decisions could be changed by changing the weighting on sub-appraisal factors (see Table 4-5).

Table 4-5: Type of case

	Project type	
	Transportation	Other
Case	Case 1	Case 2

The reasons for using two case studies are as follows. Firstly, transportation projects are promoted by an agency which was established to promote such projects and which has a great deal of experience and expert knowledge of them. Other projects are usually promoted by local government, which has less experience and expert knowledge of them than the transportation agency has of its projects, so that differences in behaviour can be expected between the two types of agency. Secondly, as there are many similar transportation projects, these can be used for 'reference class forecasting[26]', the uncertainty of costs and benefits in transport projects may be less than in other projects. Thirdly, the weightings on sub-appraisal factors may differ between transportation projects and other projects (Ko 2007). According to the data (2006-2010), it appears that policy analysts put more weight on economic and regional factors in transportation projects than on policy factors; while in other projects, policy analysts put more weight on the policy factor than on the other two sub-appraisal factors (see Table 4-6).

Table 4-6: Weighting of sub-appraisal factors according to project types

		Weightings on sub-appraisal factors		
		Economic	Policy	Regional
Project types	Transportation	**0.470**	0.318	**0.212**
	Other	0.467	**0.329**	0.204

[26] Reference class forecasting is a method of predicting the future through looking at similar past situations and their outcomes. Reference class forecasting predicts the outcome of a planned action based on the actual outcomes for a reference class of actions similar to that being forecast (Flyvbjerg, 2008).

Lastly, the discordance rate[27] may also differ between transportation projects and other projects. According to the data (2006-2010), although the total discordance ratios for the two types of project (transportation 67%: others 33%) are similar to their total ratio (69%:31%), a higher proportion of transportation projects recommended for BS are suspended (71%) than that of other projects (29%); and a lower proportion of non-recommended transportation projects have budgets selected (56%) than of other projects (44%) (see Table 4-7).

Table 4-7: Discordance ratio according to project type

		Project types		
		Transportation	Others	Total
Discordance	'Recommended', but Budget rejected	**17 (71%)**	7 (29%)	24
	'Not-recommended' , but Budget Selected	5 (56%)	**4 (44%)**	9
	Total	22 (67%)	11 (33%)	33
Total number of projects		141 (69%)	63 (31%)	204

Sample of interviewees

The research used both open-ended and semi-structured interviews. Interviewees were classified into the following categories: spenders (agency officials, local government officials, line-ministry officials), policy analysts (KDI analysts, professors, experts from private companies), the MOSF (Budget Office officials, Finance Bureau officials) and experts. Most interviewees were responsible for managing the projects or related to them in other ways.

[27] Discordance rate = number of discordance projects / total number of projects. Discordance projects are those whose BS decision did not accord with the RBS decision.

The draft interviewee list is set out in Table 4-8. Three interviewees were selected for each type of stakeholder in each case. However, it is important to recognize that MOSF officials took part in both cases (transportation and the other project), because they usually take part in budgeting or in managing PRP on projects based not on project type but on their relationship with the line ministry which is in charge all kinds of the project. Thus, there was no point in interviewing MOSF officials in relation to the specific cases, and it was only necessary to interview six MOSF officials.

Table 4-8: Classification of interviewees

Case	Spenders			Policy analysts			MOSF		Experts	Total
	Agency	Local gov't	Line-ministry	KDI analysts	Professors	Private company	Budget Office	Finance Bureau		
Case1	3		3	3	3	3	3	3	6	42
Case2		3	3	3	3	3				
Total	3	3	6	6	6	6	3	3		

4.5.2. Collecting interview data

Approaching interviewees

The researcher endeavoured to make contact with 42 potential interviewees. Approaches to interviewees were made taking into account three points: (1) different approaches were needed when making appointments for interviews with different kinds of interviewees, (2) there was a need to build up a relationship of trust with interviewees, (3) it was necessary to take into consideration each stakeholder's position.

Firstly, different strategies were needed when making appointments with different kinds of interviewees. The researcher could make an appointment with professors and experts

by personal e-mail two or three months before the field work was conducted. However, the researcher had some difficulty in making appointments with other stakeholders because they were reluctant to take part in an interview due to their busy schedules (i.e. spenders) and the stance of their organization (i.e. KDI analysts and private companies). To get round this, the researcher made appointments with several people who had influence on such interviewees in advance of the field work and made appointments with the latter through these influential people.

Secondly, establishing a relationship of trust with interviewees played an important role in getting straight answers from them. In order to achieve this relationship, the researcher was in regular contact with interviewee by e-mail for two or three months before the interview (and, indeed, for one year before the interview, in the case of some interviewees). Sometimes, the researcher's position as a government officer was helpful for achieving trust with interviewees.

Lastly, during the interviews, some interviewees were clearly careful to protect the interests of their organization. For example, some KDI analysts were reluctant to answer questions about the merit of using the current PRP methodology and the existence of intentional non-neutral behaviour in the PRP. In addition, private company analysts and professors were reluctant to answer questions about their cognition bias.

Open-ended and semi –structured interviewing

Interviews can usually be sorted into three types (Arksey, 2004: 268-273; Yin, 2003a: 90-91): an open-ended interview, a semi-structured interview, and a structured interview.

In open-ended interviews, the researcher asks the participants for their opinions without any formal or organized list of questions. On the other hand, in semi-structured interviews, the researcher follows a set of questions, using an interview guide, and responding flexibly to the direction which the interviewee takes. Lastly, in a structured interview, a researcher uses a more structured set of questions, such as a formal questionnaire.

In this study, the open-ended and semi-structured types of interview were most suited to eliciting information, given the complex and dynamic social situations involved (Arksey 2004)..

Topic guide

According to Arthur and Nazroo (2003), a topic guide which identifies key and relevant issues and subtopics to be highlighted in research can enable the interviewer to enhance the consistency of interviews; and it also allows the interviewer to modify the interview questions during the interview.

A topic guide, including interview questions, interview time and place, interviewer and interviewees, was constructed after pilot interviews, according to the categories of stakeholder. As there were big differences in the knowledge of PRP methodology among stakeholders, and some questions could be sensitive for certain interviewees, four different topic guides were necessary for the four types of stakeholders (see Appendix 2). Furthermore, in order to get data which were helpful to tackle complex and dynamic issues, some departures were made from the topic guide during the

interviews, according to the reactions of interviewees, in order to gain more information where it was forthcoming.

Pilot interviews

After confirming the draft interview questions, the pilot interviews were implemented to increase the validity of the interview questions and to minimise the possibility of including 'poorly constructed questions' (Yin, 2003a: 86). At least four pilot interviewees were needed to cover the different stakeholders: spender, policy analyst, MOSF, and expert. As pilot interviewees need to be people who can be trusted to give the researcher an honest opinion (Moore, 2006), four of the researcher's acquaintances who had experience as the four types of stakeholder were selected for pilot interviews. Two were government officials who had worked at the MOSF and in a line-ministry as the researcher's colleagues a year before the pilot interviews, and who were also studying at Birmingham University, so these people could be interviewed face-to-face. The other two were professors who had experience as policy analysts in PRP but who were currently working at the University in South Korea. The latter two were interviewed by telephone, although this was difficult, given the nine-hour time difference. Pilot interviews were held between 20th October 2012 and 6 November 2012. As there were many interview questions, the pilot interviews took between one and two hours. Interviews are supposed to take place somewhere that is familiar and non-threatening to participants, so face-to-face interviews were held in the school office, to which the interviewees were accustomed.

The pilot interviews resulted in a number of suggestions which were helpful for improving the interviews, firstly, in relation to the relevance of the interview questions, and secondly, in relation to the interview methodology.

Concerning the relevance of the interview questions, the researcher realized that there were several problems in the draft questions. Firstly, there were too many questions, including some that overlapped, so that they could not be covered within 90 minutes. Secondly, there were many technical questions which were too difficult for non-experts to understand, and which generally would not generate meaningful answers that could be used in the research. Furthermore, as these technical questions were mainly located near the start of the interview guide, they made it difficult to put participants at their ease. Lastly, although interviewees were chosen to cover the two cases, there were few questions which differentiated between the cases.

In order to solve this problem, the researcher revised several elements of the interview guide. Firstly, four different interview guides were devised, according to the categories of stakeholder in the PRP, between which there were big differences in knowledge and experience: spenders, policy analysts and MOSF officials. Secondly, the number of interview questions was reduced, cutting out those that overlapped and focusing on the most relevant questions for each stakeholder. Thirdly, the interview questions were reordered to put non-technical questions earlier in the interview. Interviewees are more comfortable when they can respond easily at the start of an interview. Lastly, some research questions which were related to the difference between the two cases were added, allowing the contrast between the cases to become clear.

There were also several implications for interview methodology that emerged from the pilot interviews. Firstly, it was realized that a time had to be agreed that would be convenient for the participants and the place chosen needed to be quiet and away from other people. For the recording of the interviews, a smart-phone could be interrupted by other people, so it was better to use a recorder (and to check it was working properly before starting the interview!). Thirdly, prompts and probes needed be included in the interview guide to speed up the interview and to keep it on track, and these prompts could best be presented as cards to which the interviewee could respond. Fourthly, it was important to put the interviewee at their ease and to announce in advance that the anonymity of the interviewee would be respected, so that they could feel safe in answering the questions frankly. Lastly, it was decided that interviews should be implemented face-to-face as far as possible, in order to get the best and most detailed response from the interviewees.

First interviews and supplementary interviews

Following these preparations, in November and December for 25 days (from 26th November to 18th December 2012), the fieldwork was carried out in South Korea. In total, 42 interviews were conducted at different venues such as offices or other meeting places between 7 am and 8 pm each day. Each interview lasted for approximately one to one and half hours. Most interviews were tape-recorded with the interviewees' permission and field notes related to the interview questions were taken at the same time. All the interviewees were very cooperative, irrespective of their stance for or against the items under discussion.

After the researcher returned to the U.K, all the interview records were reviewed and summarised and 42 full interview transcripts were made for further analysis. The interview data were then analysed. From the results of these first interviews, it was possible to confirm that PRP results affected both BS and BP decisions, and that non-neutral behaviours were exhibited by stakeholders in the PRP.

It therefore became clear that it would be useful to ask the interviewed stakeholders some further questions. In these supplementary interviews, stakeholders were asked for their opinions on the results of the researchers' analysis and their reactions to the policy alternatives that the researcher was suggesting for revising the current PRP methodology.

As the second interviews were supplementary to the first interviews, the basic interview methodology, such as type of case included, number of interviewees, and implementation of pilot interview findings, was exactly the same as for the first round of interviews. However, the supplementary interviews were undertaken via the Internet and telephone, instead of face-to-face, as the possibility of supplementary interviews had been mentioned to the interviewees in the first interview and the interviewees were now conversant with the content of the researcher's topic.

Thirty three supplementary interviews were implemented in about a month, from 13th November to 14th December 2013. Although an effort was made to reach all of the first round interviewees, some interviewees were very busy, and some could not be

contacted due to having moved their job. In total, eight spenders, fourteen policy analysts, six MOSF officials, and five experts took part in the supplementary interviews.

These supplementary interviews provided some very valuable feedback from stakeholders and experts on the results of the researcher's analysis and on the policy alternatives being suggested for revising the current PRP methodology.

4.5.3. Data Analysis

The data was collected and analysed for each research question according to the theoretical conceptual frameworks which were derived from the literature review.

The data analysis process was carried out through two steps: 'coding of data'; and 'synthesising the case studies'. Firstly, coding of data can be defined as 'reviewing a set of field notes transcribed or synthesised, and dissecting them meaningfully, while keeping the relations between the parts intact' (Miles and Huberman 1994, p.56). In this study, through computer-aided coding, the researcher created over 1,014 pieces of coded data from the first round of interviews. Through this process, the researcher was able to find new categories which were not found in the literature review (in particular, the over-stating AHP score tendency in project appraisal); and then, finally, the researcher was able to make improvements to the first draft of the theoretical conceptual framework.

Secondly, synthesising the case studies can be defined as 'aggregating findings across a series of individual studies'(Yin 2008, p.156). In this study, through analysis of the two different cases, namely a transportation project and other project, both the non-neutral behaviour of stakeholders in the PRP and the opinion of stakeholders on the PRP methodology were shown to exhibit similar characteristics between the two different cases.

For the qualitative analysis, the software Nvivo 10 was used for coding and analysis of the first and supplementary interview rounds. The process of implementing Nvivo 10 involved identifying the projects, node and classification coding, developing relationships through making a node tree, analysing queries, and writing a report (Park 2012). This software enabled the researcher to maintain a flexible approach to the coding and numerical counting of references in the interview data.

4.5.4. Ethical considerations

When developing data-collection methods we also need to consider ethical issues. Ethical issues relate to the whole research process from the development of research questions to the writing and disseminating of the research (Creswell, 2009).

According to the Economic and Social Research Council (ESRC) Framework for research ethics (2010), the following issues should be checked at the data collection stage for ethical consideration: research should be designed and implemented to ensure integrity, quality and transparency; research participants should be notified about the

research purpose and how the results will be used; research participants should be informed about the confidentiality of the information supplied by them; and research participants should take part in the research spontaneously and should have the right to withdraw at any time if they so desire.

In the same vein, De Vaus (2001) outlined four ethical issues: confidentiality, privacy, avoidance of harm to participants, and informed consent.

In order to deal with these ethical issues properly, I checked related ethical issues through the official ethical review process at Birmingham University. This ethical review covered the conduct of the project; the recruitment of, consent of, and feedback to, participants; participant ability to withdraw; confidentiality; the storage, assessment and disposal of data; the significance of the project; and the risks involved in the project.

Through this process, several documents were produced to demonstrate how ethical problems would be dealt with – an interview consent form, an interviewee recruitment form, and a participant information sheet. These documents were then used when the interview process was carried out. Firstly, the recruitment advertisement was sent out to all prospective participants when they were contacted in advance of the interviewees through e-mail. Secondly, the participant information sheet was sent to prospective interviewees, who then sent back their agreement to participate in the interview. Lastly, when the researcher met the interviewees for the interview, he explained the detailed ethical issues and completed the consent form, obtaining the signature of participants.

All participants therefore agreed with the content and signed the consent form, and most interviewees were very satisfied with the ethical approach of the study.

4.5.5. Reflexivity

One important methodological issue which arose in this study was reflexivity in relation to the researcher's background and role as a government official.

Reflexivity can be defined as a researcher being 'conscious of the tendencies, values, and experiences that he or she brings to a research study'(Creswell and Clark 2007, pp.243-244).

Considering the reflexivity involved in this study, the researcher anticipated some difficulty in accessing policy analysts, especially KDI analysts, because some research questions were related to the non-neutral behaviour of these participants in relation to the current PRP methodology, which was designed by the KDI. Moreover, the researcher was previously in charge of budgeting in relation to large-scale projects and would return to that role after finishing this thesis. For these reasons, it was important the researcher to try to visualise himself as a third party or outsider doing this research, and reflect on what his position meant in terms of conducting the research in an appropriate manner. Moreover, it was necessary to understand how to encourage interviewees to respond without having undue regard for the researcher's previous government position.

In order to reassure interviewees (and in particular the policy analysts) that this study would be conducted in a neutral way, this was made clear both through the participant's information sheet and through the researcher's oral explanation at the start of interviews, as discussed in the ethical review section above.

Consequently, the policy analysts who received an invitation to be interviewed were happy to accept the invitation and took part in the study. Moreover, it was apparent from their responses that most answered very honestly and, indeed, some answered very boldly, giving a level of detail and critique that showed they were fully confident of the researcher's impartiality in conducting the research.

4.6. Conclusion

This chapter has presented the methodological framework used in the research for this study. The chapter has recounted how the research questions were developed from the literature review, a methodological framework was developed, based on a mixed-methods strategy, and a conceptual framework for the study was outlined. Furthermore, both quantitative and qualitative designs for the study have been presented to provide a comprehensive analysis for each research question. The next chapters present the results of empirical analysis for each of the research question, based on the quantitative and qualitative approaches which have been presented in this chapter.

CHAPTER 5 THE EFFECT OF PRP RESULTS ON BUDGETARY DECISIONS

5.1. Introduction

This chapter addresses the first research question: What is the impact of PRP results on BS and BP decisions (controlling for other factors)?

It is composed of two parts:

- sub-research questions and conceptual and methodological frameworks for the first research question
- the results of regression analysis for the first research question

The first section presents sub-research questions for addressing Research Question 1. These sub-research questions were developed and presented in Chapter 4, and take account of the control variables which might affect budgetary decisions. Furthermore, a conceptual framework was developed which showed the relationship between various factors (PRP results and other factors) and budgetary decisions. After this, a methodological framework was presented, which was composed of definitions of variables (independent, dependent and control variables), and an analytic regression model for each sub research question which was composed of independent, dependent and control variables, and the data sets for these analyses. The second section showed the results of each regression analysis in terms of the mid and long term. To approach these two sub-research questions, an SPSS program is employed.

5.2. Methodological frameworks for Research Question 1

5.2.1. A conceptual framework for Research Question 1

5.2.1.1. Sub-research questions for Research Question 1

Policy information can provide supporting and background information (Weiss 1980, Dunn 1997, Kirp 2004), but it is important to recognize that PRP results may play an important active role in budget decisions on large-scale projects. Such large-scale projects are required to be subject to PRP checks according to the Public Finance Act and the PRP guidelines. According to the Public Finance Act, PRP guidelines and budget guidelines, all new large-scale projects with a total cost of 50 billion Won (£27 million) or more should be subject to PRP checks, and projects which are appraised as 'not-recommended' through the PRP should be rejected for BS (MOSF 2012a, MOSF 2012b). For this reason, contrary to the findings of previous research studies, this study considers whether the PRP results for the RBS on projects (AHP≥0.5) may be the main factor for determining BS on large-scale projects. On the other hand, according to the Public Finance Act, PRP guidelines and budget guidelines, there are no regulations or guidelines for using PRP results for BP decisions for ongoing projects which have already received approval as new projects. For this reason, PRP results may not be a factor in making decisions on annual budget allocations for ongoing large-scale projects. However, it is important to recognize that PRP results offer significant information on the feasibility and desirability of projects from the perspective of economic, policy and regional factors, and that budget officials can access PRP results, especially AHP scores, through budget request papers. For these reasons, it is of interest to explore the impact

of PRP results (AHP scores) on the BP of ongoing projects which have already received BS as new projects.

Furthermore, although, these projects have a planned project period, and should be given the standard BP (budget allocation pace over time for ongoing projects) decision in laid down in the budget guidelines, the actual BP for any project may be different from the standard BP in the budget guidelines, because the annual budget allocation for it may be delayed due to budget constraints.

For this reason, the research sub-questions that can be used to analyse the impact of PRP on budget allocation ask:

①-1. What is the impact of PRP results on BS decisions (controlling for other factors)?

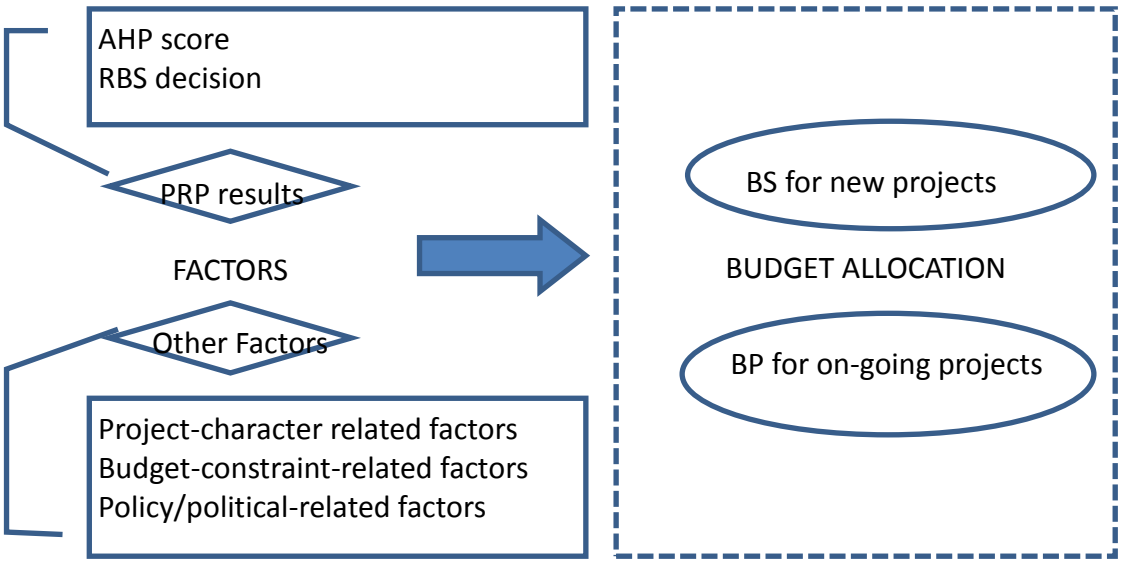
①-2. What is the impact of PRP results on BP decisions (controlling for other factors)?

5.2.1.2. A conceptual framework for Research Question 1

From the literature review (see Chapter 2) and the interview data, it is hypothesized that there are several factors which affect budget allocation on large-scale projects, and these include PRP results. Unlike other projects, as large-scale projects for which PRP results are considered will not receive a budget if it they are appraised as ‘not-recommended’ (MOSF, 2011), PRP results are hypothesized as playing an important role in BS decisions for large-scale projects compared with other projects. On the other hand, BS

decisions for large-scale projects are expected to be influenced by those factors which affect decisions on BS for publicly financed projects. For this reason, we have divided the factors which affect budget decisions on large-scale projects into two groups: PRP results, which are unique factors in BS decisions on large-scale projects; and other factors, which affect publicly financed projects. On the other hand, according to the guidelines for budget allocation, conditions for initial BS decisions are little different from those for annual budget allocation, and budget allocations can be divided into two types: BS for new projects; and BP (budget allocation pace over time) for ongoing projects (MOSF, 2011). Figure 5-1 shows the process of budget decision-making, and the relationship between factors which affect budget allocations for large-scale projects and budget decisions, which are composed of BS for new projects and BP for ongoing projects.

Figure 5-1: A conceptual framework for Research Question 1



5.2.2. Research methods for Research Question 1: quantitative analysis

We now move to a quantitative examination of the sub research question. This section introduces the dependent, independent and control variables and explains their meanings for the study. It then constructs a model for analyzing the relationships between various factors and the budget decision; and it explains the data set for analysis.

5.2.2.1. Definition and meaning of variables

From the literature review (see Chapter 2) and interview data (see Chapter 3), it was ascertained that there are twelve variables (two dependent variables; two independent variables; and eight control variables) that need to be considered in the equation for quantitative analysis of the factors affecting budget decisions (see Table 5-1). Furthermore, considering previous research and the interview data, control variables can be divided into three categories: those related to budget constraints; those related to project character; and those related to policy/political factors. As the research question seeks to examine the relationship between PRP results and budget decisions, budget decisions can be treated as the dependent variable and PRP results can be treated as an independent variable. According to the budget request guidelines (2013) and PRP guidelines (2010), budget decisions can be divided into BS (budget selection for new projects) and BP (budget allocation pace over time for ongoing projects). PRP results can also be divided into two: the AHP score, which is determined by three appraisal sub-factors (economic, policy and regional); and the RBS decision, which is determined by the AHP score (if AHP $\geq$ 0.5, projects are recommended; if not, projects are not recommended). When it comes to control variables, from the review of the literature on the effects of project performance on budget decisions and interview results, it was

decided to include eight control variables in the equation. Furthermore, it was ascertained from interviews that these variables could be divided into three categories: those related to budget constraints; those related to the character of a project; and those related to policy/political factors. In this sense, program size in relation to central government's budget expenditure (hereafter SIZE) and the division of the budgetary burden between central government and others (hereafter SHARE) can be taken as budgetary-constraint-related factors; the type of project (hereafter TRANS for transport project), the type of organization involved (hereafter MINISTRY), the geographical area involved (hereafter CAPITAL) and the relationship with other projects (hereafter RELATED) can be taken as project-character-related factors; and whether a project is promoted by the ruling party (hereafter RULING) or whether it is a major government project (hereafter MAJOR) can be taken as policy/political-related factors.

Table 5-1: Potential variables for the quantitative analysis

Category		Name of variable
Dependent variables		$Y_{i:}$ BS (Budget selection for new projects)
		$Y_{j:}$ BP (Budget allocation pace over time for ongoing projects)
Independent variables		• $X_{1:}$ AHP score
		• $D_{1:}$ RBS (Recommendation for budget selection)
Control variables	Budget constraints	• $X_{2:}$ SIZE (Program size in the context of central government budget expenditure)
		• $D_{2:}$ SHARE (Whether or not the budget burden is shared between central and others)
	Project character	• $D_{3:}$ TRANS (Type of project: transportation projects or not)
		• $D_{4:}$ MINISTRY (Type of organization: ministry projects or not)
		• $D_{5:}$ CAPITAL (capital area project or not)
		• $D_{6:}$ RELATED (Relationship with other projects: related to one another or not)
	Policy /political pressure	• $D_{7:}$ RULING (Ruling party project or not)
		• $D_{8:}$ Major (Major government project or not)

1) Dependent variables and their meanings

① BS (Budget selection for new projects)

We define a dummy variable as BS, set to '1' if a project has budget selection, and '0' otherwise. Here, 'budget selection for new projects' means final budget approval for new projects by the National Assembly. According to the *Annual Guidelines for Budget Requests* (MOSF, 2013), budget allocation decisions on projects can be divided into two: BS (budget selection for new projects); and BP (budget allocation pace for ongoing projects). The budgeting process can be divided into four steps: ① budgeting by government; approval by the National Assembly; implementation by government (MOSF, line-ministry and agency); and audit by the National Assembly (Ahn, 2010). Budgets are allocated to spenders according to a budget allocation plan, which is confirmed by a cabinet meeting after approval by the National Assembly. Thus final budget selection for new projects is given at the time when the National Assembly finally approves the official Korean budget for the year. As mentioned in Section 3, this was the context in which Ko (2007) assessed the effect of PRP results on budget decisions. According to Ko (2007), 70 per cent of projects which were appraised as 'not-recommended' according to PRP results did not get budget approval from the National Assembly. The implications of this analysis for the dependent variable (BS) are that large-scale projects should have their PRP results checked and that projects appraised as 'not-recommended' according to the PRP guidelines and the Public Finance Act (MOSF, 2013) should not be taken forward. So, it might be supposed that PRP results play an important role in decisions on BS (budget selection for new

projects). Table 5-2 shows the extent to which BS was given on new projects which had had their PRP checked between 2006 and 2010. As seen from the table, 57 per cent of these new projects received BS.

Table 5-2: Budget decisions on new projects (2006-2010)

	Budget selected : B (B/A)	Budget rejected: C (C/A)
Total: A (204)	117 (57%)	87 (43%)

② BP (Budget allocation pace over time for ongoing projects)

The 'Budget allocation pace over time for ongoing projects' can be measured by the accumulated ratio of the annual budget approved over time to the planned total budget for each large-sale project which is confirmed by the National Assembly. The accumulated budget allocation ratio can be expressed in the following equation.

▪ **BP (Accumulated budget allocation ratio) for project j at T (Y_{jT}) = ($\sum_{t=1}^{T} b_{jt}$) /B_j**

t: fiscal year. In this study, budget allocation is granted to ongoing projects which are considered by the National Assembly at only one point in the year (t = 1, 2, 3 ,…..,T_A).
b_{it}: annual budget allocation for project j at fiscal year t .
B_j: planned total budget for each project which was decided at the time of budget approval for new projects.

This equation expresses the accumulated ratio of the annual budget approved by the National Assembly for certain large-scale projects (j) in the fiscal year t. In this equation, each project has a different planned number of project years (T_P) between 1 and T years

and a different planned total budget (B_j), which were decided at the time of BS for new projects. If a project is given funding for T_p planned years, with b_1 for Year 1, b_2 for year 2, up to b_{Tp} for the final planned year, does the project get the total planned budget

(B) by T_p? This is often not the case ($\sum_{t=1}^{Tp} b_{jt} < B_j$). This mean the project has been slightly delayed, and there may be further budget years up to b_{TA} . Let me explain this concept through Table 5-3. If a certain project (j) has six planned project years ($T_P = 6_)$, the accumulated ratio of the annual budget approved for this project by the National Assembly can be operationalized as b_{j1}/B_6 for the first fiscal year; $(b_{j1} + b_{j2} + b_{j3}) / B_j$ until the third fiscal year; $(b_{j1} + b_{j2} + b_{j3} + b_{j4} + b_{j5} + b_{j6}) / B_j$ until the sixth fiscal year (T_P); and $(b_{j1} + b_{j2} + b_{j3} + b_{j4} + b_{j5} + b_{j6} + b_{jTA}) / B_6$ until fiscal year T_A. If this project can get an annual budget according to its planned budget time profile, the accumulated ratio of the approved annual budget at the end of the third fiscal year (Y_3: middle planned fiscal year) might be 0.5, and the the accumulated ratio of the approved annual budget at the sixth fiscal year (Y_6: last planned fiscal year) might be 1.0. However, considering the budget constraints, the actual time profile of the accumulated budget allocation ratio might be different from that originally planned.

Table 5-3: Annual budget allocation according to types of project planned for each year

		Annual budget allocation over time (t)									
		1st	2nd	3th	4th	5th	6th	7th		T_A	Planned total budget
Type of project planned for year (T_P)	1	b_{11}	b_{12}	b_{13}	b_{14}	b_{15}	b_{16}	b_{16}		b_{1t}	B_j
	2	b_{21}	b_{22}	b_{23}	b_{24}	b_{25}	b_{26}	b_{27}		b_{2t}	B_j
	3	b_{31}	b_{32}	b_{33}	b_{34}	b_{35}	b_{36}	b_{37}		b_{3t}	B_j
	4	b_{41}	b_{42}	b_{43}	b_{44}	b_{45}	b_{46}	b_{47}		b_{4t}	B_j
	5	b_{51}	b_{52}	b_{53}	b_{54}	b_{55}	b_{56}	b_{57}		b_{5t}	B_j

	6	***b_{61}***	***b_{62}***	***b_{63}***	***b_{64}***	***b_{65}***	***b_{66}***	***b_{67}***		***b_{6t}***	***B_j***
	7	b_{71}	b_{72}	b_{73}	b_{74}	b_{75}	b_{76}	b_{77}		b_{7t}	B_j
	T_P	B_{j1}	B_{j2}	b_{j3}	B_{j4}	B_{j5}	B_{j6}	B_{j7}	B_{jTP}	B_{jTA}	B_j

We defined the number of waves to be allotted to projects as two – for the mid-term year and the long-term year – in order to analyse the effect of PRP results on BP for large-scale projects. According to De Vaus (2001), the number of waves allotted and the gap between waves is dependent on the purpose of the research. As the purposes of this research is analysis of the impact of PRP results on budget allocations over time, and budgets are allocated annually, every fiscal year can be set as a wave. However, it is important to recognise that, according to budget request guidelines, the minimum number of planned budget years for large-scale projects is two, and the planned number of years for each project varies between two and seven. Thus, if we set different numbers of waves according to projects planned for different numbers of years, it might be difficult to compare the impact of PRP results on the different projects; and if we set more than two waves, some data, especially for two-year projects, should be excluded. For these reasons, two waves representing the mid-term and long-term years might be set in order to analyse the impact of PRP results on budget allocation over time with minimization of data loss. Mid- and long-term years can be expressed as follows.

Mid-term year = middle year of planned project (T_P) / 2

Long-term year = last year of planned project (T_P)

Let me explain this concept through Table 5-3. If a certain project is planned to last six years, the mid-term year can be operationalized as the third year (six planned project

years / 2) and the long-term year can be operationalized as the sixth year (the last of the planned project years).

One issue to be dealt with is what happens if the planned number of years is an odd number, because there is no information about the budget allocation at the halfway point in the fiscal year. For example, if the planned number of budget years is five, the mid-term year can be operationalized as year 2.5. However, as the fiscal year is accounted on an annual basis, there is no information for a 0.5 year budget allocation. In order to solve this problem, it is important to recognize that annual budget approval for projects is confirmed by the National Assembly, and budget allocations to spenders should be implemented automatically, according to the budget allocation plans confirmed by a cabinet meeting after approval by the National Assembly. Thus, if the mid-term year is operationalized as 0.5 years, the annual budget allocation can be measured as 'one budget year / 2'. Let me operationalize the BP for the mid-term year (Y_{jTm}) and BP for the long term year (Y_{jTl}) as dependent variables, in order to analyze the impact of PRP results on the budget allocation over time. The equation might be as follows.

- **BP (Accumulated budget allocation ratio) for project (j) at the mid-term year (Y_{jTm})**

=(B_j

- **BP(Accumulated budget allocation ratio) for project (j) at the long-term year (Y_{jTl})**

=(B_j

t: fiscal year. In this study, budget approval for ongoing projects which are considered by the National Assembly only once a year.

B_{jt}: annual budget allocation for the project j at T fiscal year.

B_j: planned total budget for each project j which was decided at the time of budget approval for new projects.

Tm: mid- term year = middle year of planned project T_P / 2

Tl: long- term year = last year of planned project T_P

Let me explain this concept through Table 5-3. If a certain project has six planned project years, the accumulated budget ratio at the mid-term year can be operationalized as $(b_{j1} + b_{j2} + b_{j3}) / B_j$ (until the third fiscal year) and the accumulated budget ratio at the long-term year can be operationalized as $(b_{j1} + b_{j2} + b_{j3} + b_{j4} + b_{j5} + b_{j6}) / B_j$ (until planned project year).

BP is likely to be very important for such large-scale projects. It is necessary to recognize that, as there are budget constraints on central government, the actual time for such projects' completion may be much longer than that shown in their planned timetable. When projects are delayed, the total cost may increase, due to inflation of raw material costs and the financial cost incurred by the spender for borrowing from a bank or issuing a bond. Meanwhile, delaying completion of facilities may be inconvenient for users who expected everything to be finished on time. For these reason, the decision on the time profile of the budget allocation for a large-scale project may be important. On the other hand, in contrast to public projects which have not been subject to a PRP check, the fact that large-scale projects have had such a check, and policy analysts have presented their opinions on their feasibility and desirability in the PRP results means that a budget allocated to these projects on the basis of the results is likely to be

appropriate. Although, there is no regulation requiring the use of PRP results when MOSF officials make decisions on annual budget allocation for ongoing large-scale projects, as seen from the interview results already discussed, PRP results may affect budget allocation over time. Thus, the impact of PRP results on BP decisions should be analyzed.

Table 5-4 shows the time profile of budget allocations for ongoing projects which had been subjected to PRP between 2003 and 2005 and had their budget agreed by central government between 2004 and 2012. Considering the AHP score, adopted in 2003, the maximum period for planned projects (seven years), and the one-year gap between the PRP and the budget process, the data collected between 2003 and 2005 may might be more useful for comparing the time profile of budget allocations for ongoing projects between the mid and the long terms. Table 5-4 shows that the number of projects taken forward as new public projects among the projects which had been subjected to PRP between 2003 and 2005 was 62; and the mean BP (accumulated budget allocation ratio) for large-scale projects in the long-term year is 61.5 per cent, which is about twice the size of that in the mid-term year (32.3 per cent). However, this BP ratio is much less than that of the standard BP (50 per cent for mid-term year, 100 per cent for long-term year) which is expected according to budget guidelines.

Table 5-4: BP for large-scale projects

(Unit: number of projects, ratio)

	Mid-term year ($T_P/2$)	Long-term year (T_P)
Number of projects	62	
PRP year	2003-2005	

Budget year	2004-2012	
BP[28] (actual)	0.323	0.651
BP[29] (standard)	0.5	1.0

2) Independent variables and their meanings

As Research Question 1 is related to PRP results, which affect budget decisions, PRP results can be independent variables. According to the PRP guidelines, the AHP score is an important indicator for the PRP results, and so the RBS decision, which is decided by the AHP score, can be an independent variable as well. On the other hand, although the economic, policy and regional sub-appraisal factors can be considered as independent variables, since the AHP score is determined by these three sub-appraisal factors, if the AHP score is considered as an independent variable, it is difficult to consider the three sub-appraisal factors individually as independent variables.

① AHP score: X_1

The Analytic Hierarchy Process (AHP) is a decision-making processes which involves breaking down a problem and drawing conclusions by aggregating the solutions of all the sub-problems (Saaty 1990). In the PRP, the AHP score is the weighted sum of these three sub-appraisal factors – economic, policy and regional – and it has a ratio of between 0.0 and 1.0. The sub-appraisal factors are scored on a nine-point scale and their weighting is set by the subjective judgment of policy analysts within the range

[28] Mean of the BP of 62 projects which were subjected to PRP between 2003 and 2005 and received their budget allocation between 2003 and 2012)
[29] Standard BP which is expected according to budget guidelines.

permitted range for each sub-appraisal factor (see Table 5-5). Considering the preliminary analysis (as seen from chapter 3) for factors that affect budgetary decisions, as some interviewees consider the AHP score of a project to be a good indicator for the annual budget allocation, it might be expected that AHP scores would have a positive relationship with BP decisions.

Table 5-5: Weighting range for each sub-appraisal factor

	Sub-appraisal factors		
	Economic	Policy	Balanced regional development
Guidelines	40-50%	25-35%	15-30%

② RBS (Recommendation for Budget Selection): D_2

An RBS can be determined by a project's AHP score. If the AHP score of a project is bigger than, or equal to, 0.5, the project can be appraised as 'recommended'; if not, the projects is 'not-recommended'. As this variable is expressed on a nominal scale, it can be coded as 1 (recommended) or 0 (not recommended). Table 5-6 shows the budget application decisions on projects which had been subjected to PRP between 2006 and 2010. It shows that 64 per cent of projects were appraised as 'recommended' and the other 36 per cent were appraised as 'not-recommended'.

Table 5-6: RBS decisions for projects (2006-2010)

Total : A	'Recommended' projects: B (B/A)	'Not-recommended' projects: C (C/A)
204	131 (64%)	73 (36%)

Considering that the budget guidelines forbade the issuing of BS decisions on ‘not-recommended projects’, it might be expected that the RBS would have a positive relationship with these decisions.

3) Control variables and their meanings

According to previous relevant research, other factors, such as program size, division of the budget burden between central government and other stakeholders, project type, organization type and political pressure can also have an effect on the budget decisions on large-scale projects. If the budget decisions are affected by these factors as well as by the PRP results, then we need to take the impact of these factors into account when it comes to interpreting the relationship between independent and dependent variables. Therefore the analysis model needs to control for these factors. Omitting these factors causes any estimation of the relationship between independent and dependent variables in our regression analysis to be biased (i.e. omitted variables bias). Considering the interview data in terms of the factors which affect the budget decision, we classify these control variables into three categories: budget-constraint-related factors, project-character-related factors and policy/political-related factors.

Budget-constraint-related factors

① SIZE (Project size in the context of central government expenditure): X_2

The size of a project defined as its total central government budget can be used as the proxy variable for budget constraints. As project size in terms of central government expenditure is confirmed at the time of budget approval on new projects, this variable can be used only as a variable for Research Sub-Question ①-2 (What is the impact of PRP results on BP decisions (controlling for other factors)?), which is related to ongoing projects. Considering that MOSF officials make budget decisions under the

budget constraints of central government, it might be expected that project size would have a negative relationship with BP.

② SHARE (Whether or not the total project cost is shared between central government and others): D_2

This variable can be defined as whether the total project cost can be shared with other stakeholders, such as local government and private companies. As this variable is expressed on a binary scale, it can be coded as 1 (share the burden) or 0 (do not share the burden). Considering the budgetary burden involved, central government and local government may have different views on budget decisions made on projects. As the data for this variable can be found through the financial design of projects of which the outline is set at the PRP stage, it can be used for both the sub-research questions. Considering MOSF officials make budget decisions under the budget constraints of central government, it might be expected that this variable will have a positive relationship with decisions not only on BS but also on BP.

Project-character-related factors

③ TRANS (Type of project: transportation or not): D_3

According to the PRP guidelines (KDI, 2010) and data collected for the years 2006 to 2010, projects can be divided into seven categories: road, railroad, harbour, airport, water resource, building and civil engineering. Furthermore, as seen in Table 5-7, they also can be divided into two categories – transportation and others – according to their

properties. As this variable is expressed on a binary scale, it can be coded as 1 (transportation projects) or 0 (others).

Table 5-7: Types and categories of projects

Categories of project types	Types of project	Number
Transportation	Road	97
	Railroad	29
	Harbour, Airport	15
	Sub total	141
Others	Water resource	17
	Building	36
	Civil engineering	10
	Sub total	63
Total		204

If we compare budget decisions with RBS decisions, 33 out of 204 projects which were subjected to the PRP between 2006 and 2010 received different decision on BS from their RBS. Seventeen out of 24 projects which were rejected even though they were appraised as 'recommended' were transportation projects (see Table 5-8). From these results, it might be supposed that transportation projects which were appraised as recommended are more likely to be rejected than other types. Thus, it might be expected that this variable will have a weak negative relationship with decisions on budget approval.

Table 5-8: Discordance ratios according to project types

		Project types		
		Transportation	Others	Total
Discordance *	AHP≥0.5, rejected	**17(71%)**	7(29%)	24
	AHP<0.5, selected	5(56%)	**4(44%)**	9
	Total	22(67%)	11(33%)	33
Total number of projects		141(69%)	63(31%)	204

* Discordance projects are those whose BS decision did not accord with the RBS decision.

④ MINISTRY (Type of organization: ministry project or not) : D_4

The type of organization by which projects are implemented may also affect budget decisions. As ministry projects are more likely to be policy-oriented, complex and important than others, it could be supposed that the likelihood of getting budget approval for new projects and the accumulated budget allocation ratio for ongoing projects might be higher for these projects than for some others. Thus, it might be expected that this variable will have a positive relationship with budget decisions. As this variable is expressed on a binary scale, it can be coded as 1 (ministry projects) or 0 (others).

⑤ CAPITAL (Geographical area of projects : capital area or not): D_5

The geographical area in which a project is located may affect the budget decision on it. The geographical areas of projects can be divided into two: capital area or not; and ruling party area or not. As the category 'ruling party area' can be taken to mean ruling party project or not (D_7), this variable can be measured as a capital area project or not. As capital area projects are more likely to be related to one another, and the population density of the capital area is much higher than that of other areas, it might be supposed that the likelihood of budget approval on new projects and budget allocations over time for capital area projects will be higher than for those located in other areas. Thus, it might be expected that this variable will have a positive relationship with budget decisions. As this variable is expressed on a binary scale, it can be coded as 1 (capital area projects) or 0 (others).

⑥ RELATED (Relationship with other projects : related to one another or not): D_6

Whether a project is related to one or more other projects may affect the budget decision on it. The concept of projects being related to one another can be defined as their being functionally close. For example, if the completion of one project is a prerequisite for the fulfillment of another, or one project is part of an overall program, they can be called related projects. As related projects are more likely to seem necessary than others, it might be supposed that highly related projects will be more likely to receive budgetary approval and annual budget allocations than others. On the other hand, in some cases, one project may be suspended due to the shortcomings of a related project. Thus, it might be difficult to anticipate with accuracy the relationship between this variable and the dependent variable. As this variable is expressed on a binary scale, it can be coded as 1 (highly inter-related projects) or 0 (others).

Policy/political-related factors

⑦ RULING (Ruling party project or not): D_7

Being a ruling party projects means that the project is located in the local constituency of a member of the National Assembly who is in the same party as the President. As seen from Table 5-9, even though, projects C and D are located in the same local constituencies, they are counted as different because of the party their national assembly member belongs to. Project C is counted as a ruling party project because the parties of the assembly member and that of the President are the same. However, project D is not

counted as a ruling party project because the parties of the assembly member and that of the President are different.

Table 5-9: Meaning of ruling party project

	2003	2004	2005	**2006**	2007	2008	**2009**	2010
President	Mr RO (party A)					Mr LEE (party B)		
Assembly member		Mr YUN (party A)				Mr YUN (party A)		
Project			**C** (Ruling party project)				**D** (Opposition party project)	

Considering the political system in South Korea, in which political power is concentrated in the President, it might be supposed that the power of a ruling party member in relation to a local project will be stronger than that of an opposition party member**.** Thus, it might be expected that this variable will have a positive relationship with budget decisions.

As this variable is expressed on a binary scale, it can be coded as 1 (ruling party projects) or 0 (others).

⑧ MAJOR (Major government projects): D_8

Being a major government project means being one of the presidential projects which are initiated by each newly elected government. For example, President Roh (2003-2008) presented 40 presidential tasks and President Lee (2008-2013) presented 100 presidential tasks. As major government projects are more likely to be policy-oriented,

better supported and more important than others, it might be supposed that the likelihood of getting a budget and the speed of getting it are greater for major government projects than for others. Thus, it might be expected that this variable will have a positive relationship with budget decisions. As this variable is expressed on a binary scale, it can be coded as 1 (major government projects) or 0 (others).

5.2.2.2. Constructing a model for analysis of sub-research questions

1) Setting an ideal model for Sub-Research Questions 1 and 2

According to previous research and the results of the interviews for this research, the ideal regression model for Research Question 1, which contains all the variables from the research and interview data carried out, can be set as shown in Table 5-10.

Table 5-10: Ideal model for verifying the factors which affect Y_A, Y_T

$$Y_{ij} = \alpha + \beta_1 X_1 + \beta_2 D_1 + \beta_3 X_2 + (\beta_4 D_2 + \beta_5 D_3 + \beta_6 D_4 + \beta_7 D_5 + \beta_8 D_6 + \beta_9 D_7 + \beta_{10} D_8) + \varepsilon$$

<Dependent variables>

- Y_i : BS (Budget approval for new projects: budget selected, 1, rejected, 0)
- Y_j : BP (Time profile of accumulated budget allocation ratio)

<Independent variables>
- X_1 : AHP score
- D_1: RBS (Recommendation for budget selection: 'recommended' decision, 1, 'not-recommended' decision, 0)

<Control variables>

Budget-constraint-related factors
- X_2: SIZE (Projects size in the context of central government budget expenditure)
- D_2: SHARE (Sharing the budget burden between central government and others or not, share, 1, not, 0)

Project-character-related factors
- D_3: TRANS (Type of project: transportation project, 1, others, 0)
- D_4: MINISTRY (Type of organization: ministry project, 1, others, 0)
- D_5: CAPITAL (Geographical area of project: capital area project 1, others 0)
- D_6: RELATED (Relationship with other projects: highly related project 1, others: 0)

Policy/Political-related factors
- D_7: RULING (Ruling party project or not: ruling party project 1, others 0)
- D_8: MAJOR (Major government project: major government project 1, others 0)

<Others>
- α and β are the constant and unstandardized coefficients respectively in the multiple linear regression equation
- ε: denotes an error term

On the other hand, the scale, coding and ground for each variable can be seen in the table below. As for the dependent variable, the scale for BS is 'binary' and the scale for the BP is 'ratio'. When it comes to independent variables, although the AHP score is ratio variable, the RBS decision is a binary variable. As for control variables, except for SIZE, for which the scales are 'ratio', the others are binary variables. When it comes to the grounds for each variable, these came from previous research, MOSF and KDI documents and interview data which were obtained from MOSF officials and experts.

Table 5-11: The scale and coding for each variable

Category		Name of variable	Scale	Coding	Ground
Dependent variables		$Y_{i:}$ BS	Binary	1, 0	Interview data from MOSF officials and experts (2013), MOSF (2013, 2010), KDI (2010), Ahn (2010), Ko (2007), Kwon (2009), Cho (2010), Gilmour & Lewis (2005, 2006), Shin (2013), Bang (2009), Kirp (2004), Shulock(1999)
		$Y_{j:}$ BP	Ratio	Ratio	
Independent variables		• $X_{1:}$ AHP score	Ratio	Score	
		• $D_{1:}$ RBS	Binary	1, 0	
Control variables	Budget constraints	• $X_{2:}$ SIZE	Ratio	Score	
		• $D_{2:}$ SHARE	Binary	1, 0	
	Project character	• $D_{3:}$ TRANS	Binary	1, 0	
		• $D_{4:}$ MINISTRY	Binary	1, 0	
		• $D_{5:}$ CAPITAL	Binary	1, 0	
		• $D_{6:}$ RELATED	Binary	1, 0	
	Policy /political	• $D_{7:}$ RULING	Binary	1, 0	
		• $D_{8:}$ MAJOR	Binary	1, 0	

2) Setting an analytical model for Research Question 1

In this study, considering the omitted variable bias, the collinearity problem and the limitations of the data available, the analytical multiple (binary logistic) regression

model for Research Question 1 could be set through the following process. Firstly, the dependent, independent and control variables relating to the budget decision on large-scale projects could be extracted from both interview results and the review of the relevant literature. Secondly, if there were some values for which data was not available, a suitable proxy variable could be sought (Wooldridge 2003). Finally, as minimizing the collinearity might be easier than correcting it (Keller 2011), if diagnosis showed there was collinearity between the independent variables, it would be best to remove the strongly correlated values from the equation.

(1) Analytical regression model for Research Sub-Question 1-①

What is the impact of PRP results on BS decisions (controlling for other factors)?

As seen from Table 5-10, the ideal regression model for which variables can be set through previous research and interview results has two independent variables and eight control variables. However, as some data were not available, some variables could not be used in the regression model. These omitted variables could create omitted variable bias, which would make the estimation of regression incorrect. As seen in Table 5-12, there are three omitted variables in this model: SIZE (Program size in the context of central government budget expenditure, X_5), RELATED (projects having a relationship with other projects, D_6); and MAJOR (major government projects, D_8). With regard to SIZE, as this is confirmed at the time of BS (budget selection) on new projects, it was impossible to get data about the projects which did not get a BS decision. As concerned RELATED, as the appropriate ministry did not have much information about relationships between projects, it was impossible to get data about these variables at the

time of the study. On the other hand, concerning MAJOR, as the definition of major government projects was only a rough one, there were different opinions between the appropriate ministry and the MOSF as to whether certain projects were major government projects or not. For this reason, data showing whether projects were major government projects or not could not be acquired. However, as policy factor scores, which were part of the AHP scores, could reflect projects' importance and the relationships between projects, and as projects which were located near the capital city area were likely to be related to one another, these could be the proxy variables for the omitted variables.

When it came to collinearity between the independent variables, as the RBS decision could be measured by the AHP score ('recommended' projects: AHP $\geq$ 0.5, 'not-recommended' projects: AHP score $<$ 0.5), these two independent variables might be strongly correlated with each other. In order to prevent collinearity problems, it was considered better to remove one of these variables (Keller, 2011). To select one variable, as seen from interviews on factors which affected BS, it was important to recognize that RBS decisions might be the necessary factor for BS decisions. Thus, for this research question, RBS decisions might be selected for analysis from the independent variables to minimize the collinearity problem.

Consequently, as seen in Table 5-12, the analytical regression model for Sub-Research Question **1-**① might include one independent variable and five control variables.

Table 5-12: Analytical regression model for Sub-Research Question 1-①

Category		Name of variable	Selection of variables		Analytical model
			Data availability	Collinearity	
Dependent variables		•Y_i: ***BS***	***Y***		***Y***
Independent variables		• D_1: ***RBS***	***Y***		***Y***
		• X_1 : AHP score	Y	N	N
Control variables	Budget constraints	• X_5: SIZE	N		N
		• D_2: ***SHARE***	***Y***		***Y***
	Project character	• D_3: ***TRANS***	***Y***		***Y***
		• D_4: ***MINISTRY***	**Y**		***Y***
		•D_5: ***CAPITAL***	***Y***		***Y***
		•D_6: RELATED	N		N
	Policy /political	• D_7: ***RULING***	***Y***		***Y***
		• D_8: MAJOR	N		N

In order to diagnose this regression model, the residuals, which have the information about the validity of the regression model, and multicollinearity among the variables, which would make regression analysis impossible, were to be tested.

(2) Analytical regression model for Sub-Research Question 1-②

What is the impact of PRP results on BP decisions (controlling for other factors)?

As seen in Table 5-13, as in the analytical model for Sub-Research Question 1, there were two omitted variables in this model: RELATED (relationship with other projects, D_6); and MAJOR (major government project, D_8). When it came collinearity between the independent variables, as in the analytical model for Sub-Research Question 1, the AHP score and RBS decision might be strongly correlated with each other. It was better

to remove one of these variables in order to reduce collinearity problems. As seen from the interviews exploring the factors which affected BS and BP, it was important to recognize that the AHP score might be the important factor in BP decisions. Thus, the AHP score might be selected from the independent variables for analysis for this research question in order to minimize the collinearity problem. Consequently, as seen from Table 5-13, the analytical regression model for Sub-Research Question 1-② might include one independent variable and six control variables.

Table 5-13: Analytical regression model for Sub-Research Question 1-②

Category		Name of variable	Selection of variables		Analytical model
			Data availability	Collinearity	
Dependent variables		***Y_j: BP***	***Y***		***Y***
Independent variables		• ***X_1: AHP score***	***Y***		***Y***
		• D_1: RBS	Y	N	N
Control variables	Budget constraints	• ***X_5: SIZE***	***Y***		***Y***
		• ***D_2: SHARE***	***Y***		***Y***
	Project character	• ***D_3: TRANS***	***Y***		***Y***
		• ***D_4: MINISTRY***	***Y***		***Y***
		•***D_5: CAPITAL***	***Y***		***Y***
		•D_6: RELATED	N		N
	Policy /political	• ***D_7: RULING***	***Y***		***Y***
		• D_8: MAJOR	N		N

In order to diagnose this regression model, the residuals, which have the information on the validity of the regression model and multicollinearity between variables, which make regression analysis impossible, were to be tested.

5.2.2.3.Data set for Sub- Research Questions 1-① and 1-②

Items such as computer files, survey data and census records can be used as quantitative data (Yin 2008). For the present study, 450 sets of PRP results which were released by the KDI between the years 1999 and 2010 were collected. Although PRP has been implemented since the year 1999, there have been several system changes, and data sets should be collected in accordance with these system changes. When it comes to sampling methods, the important thing in the sample design is collecting representative samples. Sample designs can be divided into two: probability sampling, and non-probability sampling (Rubin and Babbie 2008). From a theoretical perspective, although probability sampling is better in terms of sampling representativeness, if it is difficult for the researcher to know the population or whether the aim of the research is exploratory, non-probability sampling can be used (Frankfort-Nachmias and Nachmias 2007, Rubin and Babbie 2008). As the information from PRP results differs according to the period into which the system is divided (Park 2007), sampling can be implemented through the purposive sampling method, which means that the researcher's judgment is considered as an important criterion for sampling (Frankfort-Nachmias and Nachmias 2007). As seen from Table 5-14, 127 out of 450 projects appraised between 1999 and 2002 had only B/C ratio information. As the AHP system was adopted in 2003, 119 out of the 450 projects appraised between 2003 and 2005 had AHP score information as well. Furthermore, as the regional factor was separated from the policy factor in 2006, 204 out of the 450 projects appraised between 2006 and 2010 had scores for sub-appraisal factor information as well. As the AHP score (including the RBS decision) was produced in 2003, the 323 projects which had AHP score

information were the best data set for analysis on the question of the effect of PRP on the RBS decision. However, as the planned project periods suggested in the budget guidelines were between one and seven years, and most large-scale projects which should have been checked using the PRP results and the budget allocation information between 1999 and 2012 were available, the 119 projects which had been appraised between 2003 and 2005 might be better for analysis on the question of the effect of the AHP score on BP decisions.

Table 5-14: Data set for Sub- Research Questions 1-① and 1-②

			1999-2002	2003-2005	2006-2010	-2012
Change of PRP system			Adoption of PRP system	Adoption of AHP score system	Separation of regional factors from policy factors	
Data	Budget allocation		**Y**	**Y**	**Y**	**Y**
	PRP results	AHP score		**Y**	**Y**	
		Sub-factors' score			**Y**	
	Number of data sets		127	119	204	
Related sub-research questions		Sub-R.Q **1**-①		**Y**	**Y**	
		Sub-R.Q **1**-②		**Y**		

5.3. The results of the analysis

5.3.1. The impact of PRP results on BS decisions for large-scale projects

As seen from the interview results and previous research, it was hypothesized that BS for large-scale projects might be affected by several factors, such as RBS decision; and other factors, such as SHARE, TRANS, MINISTRY and RULING, might also have an effect on BS decisions on large-scale projects.

Although the main forcus of this study is on the effect of PRP results, which is a specific factor in budget decisions compared with other public projects, the model for analysis of the effect of PRP results on budget approval for large-scale projects needs to include other factors (control variables) as well, in order to avoid omitted variable bias (Wooldridge 2003).

1) Analysis of the independent variables

According to the result of a binary logistic regression (see Table 5-15), we found that the RBS decision affects the BS decision on large-scale projects, at the significance level of 0.01. Furthermore, as the effect of the coefficient on the RBS decision is positive, a regression finds that projects are likely to receive budget approval if they are appraised as 'recommended' by PRP checks.

2) Analysis of the control variables

Among the control variables, only SHARE (sharing the budget burden between central government and other stakeholders, D_2) had a statistically significant effect on BS

decisions, at the significance level of 0.01. Furthermore, as the effect of the coefficient on the RBS decision is positive, a regression finds that projects are likely to receive BS if they were designed so that the financial burden would be shared with other stakeholders. However, the other control variables did not have any statistically significant relationship with the budget approval decision. Consequently, SHARE (D_2) had a positive relationship with the budget approval decision.

3) Analysis of the Nagelkerke R Square and Hosmer and Lemeshow Test ratio

The value of the Cox and Snell R Square is 0.366 and that of the Nagelkerke R Square is 0.491, which means that the variance of the RBS decision accounts for 36.6 per cent or 49.1 per cent of the variance in BS. On the other hand, a Hosmer and Lemeshow Test provided information about the predictive capability of the binary regression model (Rossi 2009). As the p-value which tested the significance of the equation through the Hosmer and Lemeshow Test was larger than 0.05, the binary regression model employed for Sub-Research Question 1-① provided significantly better predictive power for the effect of the related variables.

From this analysis, it may be supposed that the RBS decision and SHARE play important roles in the decision on budget approval for large-scale projects. Considering the budget guidelines, which require the dropping of projects which are appraised as 'not-recommended' according to their PRP results, and the Nagelkerke R Square, which in this analysis, contrary to previous research considers policy information as an indirect indicator, it may be supposed that PRP results play an important role in BS decisions.

Table 5-15: Factors which affect BS decisions

Category		Name of variable	
Independent variables		• ***D_1: RBS***	**3.190*****
Control variables	Budget constraints	• ***D_2: SHARE***	**0.867*****
	Project character	• D_3: TRANS	-0.312
		• D_4: MINISTRY	-0.278
		• D_5: CAPITAL	0.401
	Policy /political	• D_7: RULING	-0.059
Constant			**-2.070*****
Hosmer and Lemeshow Test			**2.642**
Nagelkerke R Square			0.491
Cox & Snell R Square			0.366

$^{***}P<0.01$, $^{**}P<0.05$, $^{*}P<0.1$

5.3.2. The impact of PRP results on BP decisions

After overall BS is given on new large-scale projects, decisions have to be made about the amount of the budget that is to be paid out annually until they are completed. In spite of the standard BP (budget allocation pace over time) given in budget request guidance, decision-makers have discretionary power to make decisions on annual budget allocation. Decision-makers may allocate budgets quickly on projects which are considered important. Although there is no guideline which compels decision-makers to follow the AHP score when they decide the annual budget allocation, as the AHP score can be good indicator of the future effects of projects, it may be supposed that this plays an important role in decisions on BP.

1) Analysis of the independent variables

Table 5-16 shows that the AHP score affects positively the BP decision for large-scale projects in the mid and long term years, at the significance level of 0.01. In the mid-term year, the coefficient of the AHP score is 0.825 for BP. On the other hand, in the long term, the coefficient of the AHP score is 1.272 for BP. This means that if the AHP score increases by 10 per cent, then BP will increase by 8.25 per cent (mid-term year) and 12.7 per cent (long-term year), with a 95 per cent probability.

From this analysis, it may be supposed that the AHP score plays a role in the decision on BP on large-scale projects in the mid and long term years. From these results, although there are no guidelines on using the AHP score as an indicator for the BP decision, as there is no other good indicator for the RBS of projects and the effect of projects cannot be known until the projects are completed, it may be supposed that the AHP score is one of the indicators for decisions on BP. On the other hand, as the β value in the long-term year (1.272) is bigger than that in the mid-term year (0.825), it may be supposed that the positive relationship between AHP score and BP decision will increase as time goes on.

2) Analysis of the control variables

The control variables had different effects on BP decisions. Firstly, SIZE had a statistically significant effect on BP decisions, at the significance level of 0.05. In the mid-term year, the coefficient of program size was -1.825E-5 for the BP decision. On the other hand, in the long-term year, the coefficient of program SIZE is -2.280E-5 for the accumulated budget allocation ratio. From this analysis, it might be supposed that

SIZE has a statistically significant negative relationship with the accumulated budget allocation ratio in the mid and long-term years, and as the negative β value in the long-term year (-2.280E-5) is bigger than that in the mid-term year (-1.825E-5), the negative effect increases as time goes on.

Secondly, SHARE had a statistically significant effect on the BP decision in the mid and long-term years, at the significance level of 0.1. In the mid-term year, the coefficient of SHARE is 0.227 for the BP decision. On the other hand, in the long term, the coefficient of SHARE is 0.284 for the BP decision. From this analysis, it might be supposed that SHARE has a statistically significant positive relationship with the BP decision in the mid and long term, and as the positive β value in the long term (0.284) is bigger than that in the mid-term year (0.227), the positive effect increases as time goes on.

Finally, CAPITAL had a statistically meaningful effect on the BP decision in the mid-term year. However, it did not have any statistically significant relationship with the BP decision in the long-term year. As the effect of the coefficient on the BP decision is positive, so a regression finds that projects are likely to receive a budget allocation more swiftly if they located in or around the capital city.

On the other hand, the other control variables did not have any statistically significant relationship with BP decisions. Consequently, SIZE had a negative relationship with BP decisions, and CAPITAL and SHARE had a positive relationship with them.

3) Analysis of the R square and F ratio

The R square is the indicator in the regression model which can explain the variance of the dependent variable. The R squares in this regression model are 0.327 (mid-term year) and 0.307 (long-term year). This means that the independent and control variables in this model can explain 32.7 per cent and 30.7 per cent of the variation in the accumulated budget allocation ratio in the mid-term year and long-term year respectively. On the other hand, the F ratio provides information about the predictive capability of the regression model. The F values which tested the significance of the equation were all statistically significant at the significance level of 0.00 in both the mid and the long-term years. For this reason, it may be supposed that the regression model which was employed in this study provided significantly better predictive power for the effect of related independent (control) variables on dependent variables.

Table 5-16: Factors which affect the BP decision

Category		Name of variable	Mid term	Long term
Independent variables		• ***X_1 : AHP score***	**0.825*****	**1.272*****
Control variables	Budget constraints	• ***X_5: SIZE***	**-1.825E-5****	**-2.280E-5****
		• ***D_2: SHARE***	**0.227****	**0.284****
	Project character	• D_3: TRANS	-0.040	0.039
		• D_4: MINISTRY	-0.002	0.052
		•***D_5: CAPITAL***	**0.201****	0.059
	Policy /political	• D_7: RULING	0.063	0.090
Constant			**-0.407***	-0.441
F			**3.325*****	**3.039*****
R square			0.327	0.307
Adjusted R square			0.228	0.206

$^{***}P<0.01$, $^{**}P<0.05$, $^{*}P<0.1$

5.4. Conclusion

This chapter analysed the impact of PRP results on the budgetary decision for large-scale projects. With respect to the impact of PRP result on the BS (budget selection for new projects) decision, the chapter found two main findings as follows. Firstly, the RBS (AHP$\geqslant$0.5 or not) plays a positive role in BS decisions. Secondly, SHARE (sharing the budget burden between central government and others or not) plays a positive role in BS decisions. When it comes to the impact of PRP results on the BP (budget allocation pace over time for ongoing projects) decision, the chapter had three main findings, as follows. Firstly, the AHP score plays a positive role in the BP decision for a project in the mid and long-term years. Furthermore, the impact of this score increases as time goes on. Secondly, SIZE (size of projects) plays a negative role in BP decisions in the mid and long-term years. Furthermore, the impact of SIZE increases as time goes on. Thirdly, SHARE (sharing the budget burden between central government and others or not) plays a positive role in BS decisions in the mid and long-term years. Lastly, CAPITAL (geographical area of project) plays a positive role in BS decisions in the mid-term year. However, the impact of this feature in the long-term year was not clear. The detail meanings of these findings will be discussed in Chapter 8.

The next chapter will analyze the effects of current PRP methodology on PRP results, which have been shown to be one of the important influences on budget decisions through this chapter. The chapter will then explore the opinions of stakeholders on the current PRP methodology in order to suggest policy alternatives for current PRP methodology.

CHAPTER 6 THE APPROPRIATENESS OF PRP METHODOLOGY

6.1. Introduction

This chapter addresses the second research question: Does the current PRP methodology, from the perspective of different stakeholders, lead to inappropriate decisions in terms of the set of projects which are recommended for selection?
This examines the question of the overall suitability of the current PRP methodology in its practical application in Korean project planning, through both quantitative and qualitative approaches.

The chapter is composed of two parts:

- sub-research questions, and the conceptual and methodological frameworks for Research Question 2
- the results of the analysis undertaken for the sub-research questions.

The first section presents four sub-research questions through which Research Question 2 is approached. These four sub-research questions were developed in Chapter 4. Furthermore, a conceptual framework was developed which showed the relationship between PRP results and PRP methodology. After this, the methodological framework is presented, and this is composed of an interview framework for a qualitative approach and an analytical model for a quantitative approach.

The second section shows the results of the analysis for each sub-research question.

Firstly, the results of the analysis of the effects of the current PRP methodology on RBS decisions are presented (Research Sub-Question 2-①). After this, the appropriateness of using current PRP methodology is explored through the opinions of stakeholders who have taken part in the PRP process using the current PRP methodology (Research Sub-Question 2-②). Furthermore, we shall consider the opinions of the interviewees, and the findings of the literature review, on alternatives to the current PRP methodology, so that in the last section (Research Sub-Question 2-③, 2-④.) possible policy alternatives can be compared with each other in terms of their likely effects on RBS decisions, and the different thinking of each stakeholder about these alternative PRP methodologies will be explored.

The research questions on opinions about the current PRP methodology and policy alternatives are open-ended, and they can be explored by analyzing the interview data through the NVIVO program. As the other research sub-questions are about descriptions of RBS decisions which have been changed by changing the scoring and weighting methodology, they can be analyzed by quantitative data through the EXCEL and SPSS programs (covariance and T-test).

6.2. Methodological framework for Research Question 2

6.2.1. Conceptual framework for Research Question 2

6.2.1.1. Sub-questions for Research Question 2

The second research question is: Does the current PRP methodology, from the perspective of different stakeholders, lead to inappropriate decisions in terms of the set of projects which are recommended for selection?

The four sub-research questions for addressing Research Question 2 are as follows.

2-①. What are the effects of the current PRP methodology on RBS decisions?

2-②. What are the views of stakeholders in the PRP on whether the current PRP methodology leads to appropriate RBS decisions - and what are the reasons for these views?

2-③. What would be the effects of possible alternative PRP methodologies on RBS decisions?

2-④. How desirable do different stakeholders think these alternative PRP methodologies would be?

6.2.1.2. Conceptual framework for Research Question 2

As seen from the previous analysis of the relationship between PRP results and budgetary decisions (Chapter 5), PRP results (AHP scores and RBS decisions) play an important role in budget allocation. In this chapter, the fitness-for-purpose of the current PRP methodology, which produces PRP results, will be explored.

There are three appraisal sub-factors of AHP scores: economic, policy and regional factors. These are assessed by multiplying their scores by their weights, so that the AHP scores and RBS decisions are generally sensitive to both the scoring and the weighting methodology. Under the current PRP methodology, each policy analyst can produce a different score for each appraisal sub-factor and can set a different set of weights for each appraisal sub-factor. The final AHP score can be measured by adding together the sub-appraisal factors' scores, which are produced by multiplying the average weights and scores obtained by policy analysts. If we suppose there are six policy analysts i who take part in PRP on project j, the equation for AHP_j can be presented as follows.

AHP_j

$$= \{(\sum_{i=1}^{6} s_{eij}) /6 \times (\sum_{i=1}^{6} w_{eij}) /6\} + \{(\sum_{i=1}^{6} s_{pij}) /6 \times (\sum_{i=1}^{6} w_{pij}) /6\} + \{(\sum_{i=1}^{6} s_{rij}) / 6 \times (\sum_{i=1}^{6} w_{rij}) /6\}$$

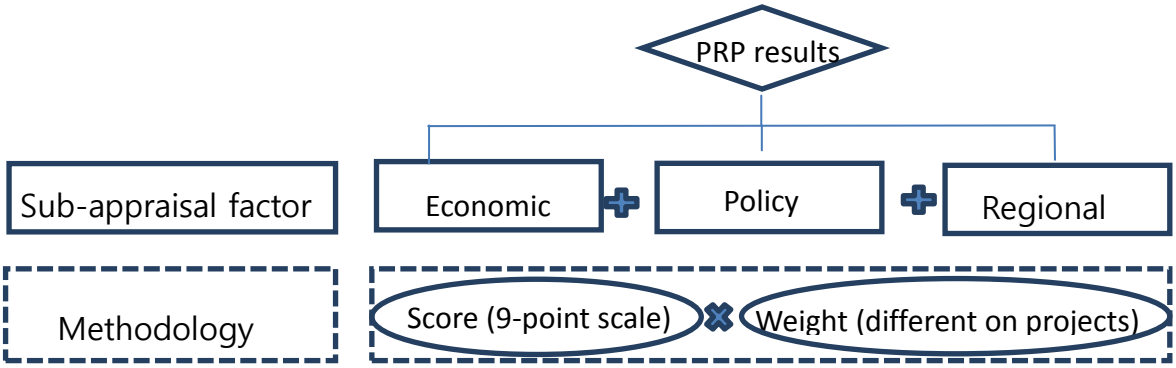
s_{eij} : score for economic factor of project j which is produced by policy analyst i
w_{eij} : weight for economic factor of project j which is set by policy analyst i
s_{pij} : score for policy factor of project j which is produced by policy analyst i
w_{pij} : weight for policy factor of project j which is set by policy analyst i
s_{rij} : score for regional factor of project j which is produced by policy analyst i
w_{rij} : weight for regional factor of project j which is set by policy analyst i

This equation can be expressed simply by using an abbreviation (i.e. $\sum_{i=1}^{6} s_{eij} = S_{ej}$)

$$\mathbf{AHP_j = (S_{ej} \times W_{ej}) + (S_{pj} \times W_{pj}) + (S_{rj} \times W_{rj})}$$

Figure 6-1 shows the mechanism for producing PRP results (the AHP score and the RBS decision which is decided by the AHP score). According to the PRP guidelines, the scores of appraisal sub-factors are assessed using a nine-point scale methodology and the weighting for appraisal sub-factors can be set differently for each project, according to the subjective judgment of each policy analyst. Thus, the nine-point scale methodology, the different weights given to projects, and the subjective judgment of each policy analyst all combine to produce each AHP score.

Figure 6-1: Mechanism for producing PRP results (AHP score, RBS)



There are several alternative methodologies which might be used for scaling and weighting, such as a balanced scale methodology and weighting methodologies in which the same set of weights is given to all projects or the same set of weights is given to each project type. Combining these components differently leads us to six different methodologies, as set out in Table 6-1. The methodology described above is just one possible methodology, and the five alternatives are labelled Types 1 to 5.

Table 6-1: Alternative methodology to current AHP methodology

	Scale methodology on B/C ratio

			Nine-point	Balanced
Weighting methodology	Different weights for projects		Current	Type 1
	Same weights:	within each project type	Type 2	Type 3
		for all projects	Type 4	Type 5

6.2.2. Research methods for Research Question 2

Table 6-2 shows the research methods used for answering Research Question 2. As Research Sub-Questions 2-① and 2-③ are about the relationships between variables, they can be subjected to quantitative analysis. On the other hand, research Sub-Questions 2-② and 2-④ explore the opinions of stakeholders about using the current PRP methodology and adopting alternative methodologies, and thus these can be explored through a qualitative approach (Creswell 2009).

Table 6-2: Research methods for Research Question 2

	Research Methods	
	Quantitative analysis	Interview
2-①. What are the effects of the current PRP methodology on RBS decisions?	**Y** (employ this method)	
2-②. What are the views of stakeholders in the PRP process on whether the current PRP methodology leads to appropriate RBS results - and what are the reasons for these views?		**Y**
2-③. What would be the effect of possible alternative PRP methodologies on RBS decisions?	**Y**	
2-④. How desirable do different stakeholders think these alternative PRP methodologies would be?		**Y**

6.2.3.1. Interviews to explore Research Sub-Questions 2-② and 2-④

We divided the stakeholders in the PRP process into three groups: spenders, the Ministry of Strategy and Finance (hereafter called MOSF) and the Korean Development Institute (hereafter called KDI), which includes policy analysts (Kim 2007). We classified the interviewees into the following categories: spenders (agency, regional and local government officials, line-ministry officials), policy analysts (KDI analysts, professors, experts from private companies), the MOSF (Budget Office, Finance Bureau) and experts (see Table 6-3).

Table 6-3: Classification of interviewees for Research Question 2

Case	Spenders			Policy analysts			MOSF		Experts	Total
	Agency	Local gov't	Line-ministry	KDI analysts	Professors	Private company	Budget Office	Finance Bureau		
Case1	3		3	3	3	3	3	3	6	42
Case2		3	3	3	3	3				
Total	3	3	6	6	6	6	3	3		

6.2.3.2. Quantitative analysis for Research Sub-Questions 2-① and 2-③

As Research Sub-Questions 2-① and 2-③ are related to the impact that the scores and weights determined by the nine-point scale and current weighting methodology have on PRP results (AHP scores and RBS decisions), the relationship between PRP results (AHP scores and RBS decisions) and the scores and weights of the appraisal sub-factors should be defined in advance. This relationship can be expressed in the following equation (which is developed from the equation previously presented in Section 6.2.1.2.).

$$\mathbf{AHP_j = (S_{ej} \times W_{ej}) + (S_{pj} \times W_{pj}) + (S_{rj} \times W_{rj})}$$

S_{ej} : average score for economic factor of project j which is produced by six policy analysts

W_{ej} : average weight for economic factor of project j which is produced by six policy analysts

S_{pj} : average score for policy factor of project j which is produced by six policy analysts

W_{pj} : average weight for policy factor of project j which is produced by six policy analysts

S_{rj} : average score for regional factor of project j which is produced by six policy analysts

W_{rj} : average weight for regional factor of project j which is produced by six policy analysts

RBS decision

if $AHP_j \geqslant 0.5$: Recommended

if $AHP_j < 0.5$: Not-recommended

As seen from the equation, RBS decisions are determined by AHP scores. If projects achieve a score of more than, or equal to, 0.5 AHP, it is recommended that they be taken forward; if this is not the case, they are classified as projects which cannot be recommended for taking forward.

Analytical model for the analysis used for Research Sub-Question 2-①

Research Sub-Question 2-① is about the impact of the nine-point scale and the weighting of the current methodology on RBS decisions. We explored the impact of the score and weighting methodology on AHP results by comparing these with alternatives.

Firstly, for the impact of the nine-point scale, weights for each appraisal sub-factor are taken as being the same as the value that was given them by policy analysts when they were appraised. Furthermore, it is important to recognize that economic factors can be produced from objective data (the B/C ratio), and the other two factors' scores are

produced from analysts' subjective judgment. Thus the impact of the scale methodology can be analyzed through converting objective data (the B/C ratio) into an AHP priority score (economic score). For this reason, policy scores and regional scores are also are taken to have the same value as that given them by policy analysts when they were appraised.

<Model for analyzing the impact of scale methodology (for the B/C ratio) on an RBS decision>

- $\mathbf{RBS_j\ (AHP_j)} = (\boldsymbol{S_{ej}} \times \underline{W_{ej}}) + (\underline{S_{pj}} \times \underline{W_{pj}}) + (\underline{S_{rj}} \times \underline{W_{rj}})$

  · *Italic characters means that these were changed by the use of an alternative scale or weighting methodology*

  · *Under line (_) means that these had the same value as when they were appraised by policy analysts.*

Secondly, for the impact of current weighting methodology, the scores for each project are taken as being the same as the value given them by policy analysts when they were appraised.

<Model for analyzing the impact of current weighting methodology on an RBS decision>

- $\mathbf{RBS_j\ (AHP_j)} = (\underline{S_{ej}} \times \boldsymbol{W_{ej}}) + (\underline{S_{pj}} \times \boldsymbol{W_{pj}}) + (\underline{S_{rj}} \times \boldsymbol{W_{rj}})$

  · *Italic characters means that these were changed by the use of an alternative scale or weighting methodology*

  · *Under line (_) means these had the same value as when they were appraised by policy analysts.*

Model for the analysis used for Research Sub-Question 2-③

Research Sub-Question 2-③ is about the impact of possible alternative methodologies on RBS decisions. As seen from Table 6-1, there are five alternatives to the current PRP methodology, and these differ according to their scales and weighting methodology: Type 1 (balanced scale + current weighting methodology), Type 2 (nine-point scale + same weights within project type), Type 3 (balanced scale + same weights within project type), Type 4 (nine-point scale + same weights for all projects), and Type 5 (balanced scale + same weights for all projects). Considering the character of each type of alternative, the model for analyzing the impact of each type on RBS decisions can be set as in the following equations.

<Model for the analysis of a Type 1 methodology (balanced scale + current weighting methodology)>

▪ $\mathbf{RBS_j\,(AHP_j)} = (\boldsymbol{S_{ej}} \times \underline{W_{ej}}) + (S_{pj} \times \underline{W_{pj}}) + (\underline{S_{rj}} \times \underline{W_{rj}})$

· *Italic characters means that this was changed by the use of an alternative scale or weighting methodology*

· *Under line (_) means these had the same value as when they were appraised by policy analysts.*

<Model for the analysis of Type 2·4 methodology (nine-point scale + alternative weighting methodology)>

▪ $\mathbf{RBS_j\,(AHP_j)} = (\underline{S_{ej}} \times \boldsymbol{W_{ej}}) + (\underline{S_{pj}} \times \boldsymbol{W_{pj}}) + (\underline{S_{rj}} \times \boldsymbol{W_{rj}})$

· *Italic characters means that these were changed by the use of an alternative scale or weighting methodology*

· *Under line (_) means these had the same value as when they were appraised by policy analysts.*

<Model for the analysis of Type 3·5 methodology (balanced scale + alternative weighting methodology)>

▪ $\mathbf{RBS_j\ (AHP_j)}$ = $(\boldsymbol{S_{ej}} \times \boldsymbol{W_{ej}}) + (\underline{S_{pj}} \times \boldsymbol{W_{pj}}) + (\underline{S_{rj}} \times \boldsymbol{W_{rj}})$

· *Italic characters means that these were changed by the use of an alternative scale or weighting methodology*

· *Under line (_) means these had the same value as when they were appraised by policy analysts.*

6.3. The results of the analysis

6.3.1. The results of the analysis for Research Sub-Question 2-①

: What are the effects of the current PRP methodology on RBS decisions?

Research Sub-Question 2-① is about the effect of the current PRP methodology on RBS decisions. As seen from Chapters 2 and 3, the nine-point scale methodology permits the discretization of ratios, and the current weighting methodology lets policy analysts have discretion in setting weights within the permitted range (weight for the economic factor 40–50 per cent, for the policy factor 25–35 per cent, and for the regional factor 15–30 per cent). Furthermore, we have stated that there are several alternatives to the current methodology. For this reason, before exploring the appropriateness of using current PRP methodology, the effect of the current nine-point scale methodology and current weighting methodology on RBS decisions should be analyzed.

6.3.1.1. The effect of the current nine-point scale methodology on RBS decisions

1) Analytical method for the research question

In order to analyze the impact of the nine-point scale methodology on RBS decisions, RBS decisions reached by using the current scale methodology can be compared with those reached by using the balanced scale methodology. As seen in Chapter 2, the balanced scale has equal distances between its points and it is a possible alternative to the nine-point scale. For this reason, the balanced scale methodology provides a good

opportunity for comparisons between, and analysis of, the effect of the nine-point scale's discretization on RBS decisions.

Discretization of the ratio on the nine-point scale in PRP

The nine-point scale methodology which is used to convert the B/C ratio into an economic score permits discretization. As seen from the formula (1) which is created by the nine-point scale, the B/C ratio is changed into an AHP standard score for the economic factor and then, through the process of scoring for suitability (see Table 6-4), the AHP standard score can be changed into an economic priority score.

Formula(1): AHP standard score of B/C = $5.11532 \times \ln$ (B/C ratio) + i

(B/C ratio $\geq 1 \rightarrow i = 1$, B/C ratio $< 1 \rightarrow i = -1$)

Let me explain the meaning of the discretization of ratio scales in AHP. As seen in Table 6-4, the range of priority scores for a B/C ratio of between 0.8 and 1.2 (increment 0.4) is between 0.26 and 0.72 (increment 0.46). Although the ratio of the increment for the total B/C ratio is 18.6 per cent (0.4/(2.54 – 0.39)), the range of priority scores for the total B/C ratio is 57.5 per cent (0.46/(0.9-0.1)). On the other hand, the range of priority scores for a B/C ratio of between 2.0 and 2.54 (increment 0.54) is between 0.87 and 0.9 (increment 0.03). Although the ratio of the increment for the total B/C ratio is 25.1 per cent (0.54/(2.54 – 0.39)), the range of priority scores for the total B/C ratio is only 3.8 per cent (0.03/(0.9-0.1)).

Alternative scale methodology: a balanced scale methodology

As seen in Chapter 2, a scale on which the points are equally far apart from each other can be called a balanced scale. As seen from Table 6-4, a balanced priority can be

created by setting the range at the same distance from B/C = 1.0 and converting it into a priority with a balanced scale in proportion to the B/C ratio. Unlike the nine-point scale (current methodology), which has discretization of ratio, the balanced scale has the same distance between points on the scale, which is in proportion to the B/C ratio.

Table 6-4: Comparing the nine-point scale and the balanced scale for B/C ratio

B/C ratio	Nine-point scale (status quo)		Balanced priority (Case 1)
	AHP standard score	Priority	
2.54	9	***0.9***	0.90
2.0	6.69	***0.87***	***0.90***
1.4	3.89	***0.80***	***0.66***
1.2	2.57	***0.72***	***0.58***
1.1	1.82	***0.65***	***0.54***
1.0	1.0	***0.5***	***0.5***
0.90	-1.91	***0.34***	***0.46***
0.80	-2.92	***0.26***	***0.42***
0.70	-4.06	***0.20***	***0.38***
0.60	-5.39	***0.16***	***0.34***
0.50	-6.69	***0.13***	***0.30***
0.39	-9	***0.10***	***0.26***
0.30		0.10	***0.22***
0.20		0.10	***0.18***
0.10		0.10	***0.14***
0.00		0.10	***0.10***

According to the scale methodology used, the economic priority score and RBS (AHP score) can be different even though the B/C ratio is the same. For example (see Table 6-5), if the B/C ratio of a project is 0.9, it can be converted into an economic priority score of 0.34 on the nine-point scale; or it can be converted into an economic priority score of 0.46 on the balanced scale (see Table 6-4). Consequently, although the ratio is same (0.9), the AHP scores can be different from each other (0.480 and 0.536) according to the scale methodology used to convert the B/C ratio into economic priority.

Thus it can be seen that the scale methodology used can play an important role in producing the PRP result. As there is disagreement as to which of the two scale methodologies is the better for reflecting real differences in the judgments of analysts (Schoner and Wedley 1989), comparing the effects of the nine-point scale and the balanced scale on the basis of real empirical data is important. In this section, a comparative analysis will be made on the basis of empirical data from a South Korean PRP.

Table 6-5: Comparing the use of a balanced scale and a nine-point scale for a B/C ratio

Assessment items			Weight (A)	Priority score(B)		AHP(A*B)	
				Nine-point scale	Balanced scale	Nine-point scale	Balanced scale
Total						**0.480**	**0.536**
Level 1	Level2	Level3					
Economic analysis			0.468	**0.34**	**0.46**	**0.160**	**0.215**
Policy analysis			0.311				
	Consistency and attitude		0.248				
		Consistent with higher plan	0.109	0.88		0.089	0.089
		Attitude toward project	0.139	0.854		0.119	0.119
	Project risk		0.063				
		Financial feasibility	0.053	0.398		0.021	0.021
		Environmental impact	0.011	0.414		0.005	0.005
Balanced regional development			0.221				
	Regional backwardness analysis		0.147	0.229		0.034	0.034
	Regional economic impact		0.074	0.714		0.053	0.053

The balanced scale, which gives uniformly distributed priorities, might better capture the difference between the objects of the study, and might be one possible solution to the asymmetry problem (Salo and Hämäläinen 1997). In order to compare the nine-

point scale and the balanced scale, several cases using the balanced scale can be looked at. As seen from Table 6-6, the balanced priority can be arrived at through setting the range at the same distance from B/C = 1.0 and converting it into a priority with the balanced scale in proportion to the B/C ratio. Each case has the balanced scale set differently, according to the extreme value, which is excluded. Each case is looked at by a process which consists of excluding the extreme value, and setting the balanced scale in proportion to the B/C ratio. Each case is looked at based on the distribution of the B/C ratio between the years 2006 and 2010. As it is necessary to have a good number of cases under different conditions in order to investigate how consistently findings hold up (Yin, 2009), five cases were established by considering the extreme value related to the number of excluded data: Case 1 (Include equal intervals from 1), Case 2 (Exclude below 1 per cent and include equal intervals from 1), Case 3 (Exclude below 2.5 per cent and include equal intervals from 1), Case 4 (Exclude below 5 per cent and include equal intervals from 1), and Case 5 (Exclude below 10 per cent and include equal intervals from 1).

Table 6-6: Cases using a balanced scale

Case	Range of BC ratio		
	Minimum	Maximum	
Case 1	0.0	2.0	Include equal intervals from B/C 1
Case 2	0.07	1.92	Exclude below 1% and include equal intervals from B/C 1
Case 3	0.1	1.9	Exclude below 2.5% and include equal intervals from B/C 1
Case 4	0.17	1.83	Exclude below 5% and include equal intervals from B/C 1
Case 5	0.35	1.63	Exclude below 10% and include equal intervals from B/C 1

Data set for research sub-questions

As this analysis was to be implemented by applying different methodologies to past data, the data could be collected from the PRP results of projects which had already been subjected to the PRP process.

The AHP system was adopted in the year 2003, and AHP score information was available for 119 out of the 451 projects which had been appraised between 2003 and 2005. Furthermore as the regional factor was separated from the policy factor in the year 2006, 204 out of the 451 projects which had been appraised between 2006 and 2010 had a score for appraisal sub-factor information. As the research sub-questions for Research Question 2 are related to the justification of the scale and weighting methodologies for appraisal sub-factors, the 204 projects which had all possible kinds of PRP information were the best data set for analysis for Research Question 2.

2) The effect of the current nine-point methodology on RBS decisions (by comparing balanced scale)

We applied a different methodology to past PRP data to obtain the results set out in Table 6-7. From these results, we see that the use of the nine-point scale was less likely to produce a decision to recommend than the use of the balanced scale. As can be seen in Table 6-7, in the cases studied, between seven and 13 projects out of 204 projects had their RBS decisions changed from ‘not-recommended’ to ‘recommended’ when the scale methodology which converted the B/C ratio into an economic score was changed from the nine-point scale to the balanced scale. However, none of the projects had its RBS decision changed from ‘recommended’ to ‘not-recommended’.

As the other factors' scores and all the factors' weights were the same as the values they were assigned by policy analysts when they were appraised, we realized that the scale methodology used might affect RBS decisions through converting the same B/C ratio into different economic scores according to the different scale methodology used. Furthermore, we realized that there was an asymmetry between the number of changes from 'not-recommended' to 'recommended' and the number of changes from 'recommended' to 'not-recommended' when the scale methodology was changed from the nine-point to the balanced scale.

Table 6-7: Changes to RBS decisions when the weighting of appraisal sub-factors was changed

(Unit: number of projects, %)

		9 point scale	Balanced scale				
			Case 1 (0.0-2.0)	Case 2 (0.07-1.92, 1%)	Case 3 (0.1-1.90, 2.5%)	Case 4 (0.17-1.83, 5%)	Case 5 (0.37-1.63, 10%)
Change of RBS decision	recommended→ not-recommended (A)	-	**0**	**0**	**0**	**0**	0
	Not-recommended → recommended (B)	-	**8**	**7**	**8**	**7**	**13**
Number of changes (C)			8	7	8	7	13
Total number (D)		204	204	204	204	204	204
Changing ratio (C/D)			3.92%	3.43%	3.92%	3.43%	6.37%
A/C			0%	0%	0%	0%	0%
B/C			100%	100%	100%	100%	100%

6.3.1.2. The effect of the current weighting methodology on RBS decisions

In this section, the effect of the current weighting methodology on RBS decisions will be analyzed by comparing this methodology with an alternative in which policy analysts have to set same weight for each project according to weights fixed by guidelines.

It is important to recognize that policy analysts have no discretion in setting weights for each project under the alternative weighting methodology. Thus, in this section, we can analyze the effect of the discretionary powers of policy analysts on RBS decisions in the current methodology through comparing the results of the two different weighting methodologies.

1) Analysis methods for the research sub-question

According to Jacobs and Goddard (2007), as composite indicators are sensitive to aggregation methods, changing the weighting rule can substantially influence the results of composite indicators. Goldstein and Spiegelhalter (1996) suggest that the rankings of performance indicators are unstable. Considering the discretionary powers, within the range permitted by the guidelines, of policy analysts over weighting, changing the weights for each appraisal sub-factor may impact substantially not only on the AHP score but also on the RBS decision (AHP≥0.5). Contrary to the study of Jacobs and Goddard (2007), in which changes to ranking were found to be very significant, it is necessary to recognize that because the PRP guidelines forbid the launching of 'not-recommended' projects, the RBS decision on each project (AHP≥0.5) may have a more

important meaning than ranking among projects. For this reason, the sensitivity of decisions on RBS (AHP≥0.5) to the weights of appraisal sub-factors should be analyzed.

The current weighting methodology

The current weighting methodology gives policy analysts discretionary powers to set different weightings on projects, within the range permitted for each appraisal sub-factor (see Table 6-8).

Table 6-8: Weighting range of AHP scores

	Appraisal factors		
	Economic	Policy	Balanced regional development
Guidelines	40-50%	25-35%	15-30%

An alternative weighting methodology

Under the current weighting methodology, as the policy analysts involved in PRP give each project different weightings, within the range permitted by the guidelines, the effect on RBS decisions of having different weightings for each project can be analyzed by comparing these decisions with the RBS results which are produced by giving the same weighting to each project. Furthermore, the overall tendencies of policy analysts working on PRP can be analyzed through comparing the RBS results for each project which are produced by different weighting methodologies (current and alternative weighting methodologies). As seen in Table 6-9, several different cases for alternative weighting methodology can be set considering the range permitted by the guidelines. By applying these different fixed alternative weightings to each score for the same appraisal

sub-factors, the impact on the original composite indicator (RBS) according to different weightings can be explored. Firstly, the weighting for Case 1 is composed of average of weights for each appraisal sub-factor, as permitted by the PRP guidelines. Secondly, the weighting for Case 2 is composed of extreme weights for policy and regional factors, within the range permitted by the guidelines. Thirdly, the weighting for Case 3 is composed of extreme weights for economic and policy factors, within the range permitted by the guidelines. Lastly, the weighting for Case 4 is composed of extreme weights for policy and economic factors, within the range permitted by the guidelines. Contrary to the current methodology of PRP, in which projects have different weightings set by policy analysts, in these cases, each project has the same weighting, which is fixed according to cases.

Table 6-9: Weighting for appraisal sub-factors, according to case

	Weights for appraisal sub-factors		
	Economic	Policy	Regional
PSF Guidelines	40-50%	25-35%	15-30%
Case 1: average (by guidelines)	46%	31%	23%
Case 2: extreme weight for regional factor	45%	25%	30%
Case 3: extreme weight for economic factor	50%	25%	25%
Case 4: extreme weight for policy factor	40%	35%	25%

Data sets

As there are many projects which do not have certain appraisal sub-factors at Level 3, such as preparedness, and project-specific items, we decided to divide the data sets in order to distribute the weight equally to each project. If all projects are treated as belonging to the same data set in spite of the different composition of their appraisal

sub-factors, we cannot explore the effect of changing weighting methodology on RBS precisely, because if we do not divide the data set differently, according to the different composition of appraisal sub-factors, the AHP score can be affected not only by changing weighting methodology but also by the different composition of appraisal sub-factors. Although 16 cases of 0064ata sets can be made, because there are four optional appraisal sub-factors, considering the rule of five[30], three data sets which offer more than five pieces of data will be analyzed in this study (see Table 6-10).

Table 6-10: Data sets for analysis

Appraisal sub-factors			Data set			
			Total	Data set 1	Data set 2	Data set 3
Level 1	Level 2	Level 3				
1. Economic analysis				Y	Y	Y
2. Policy analysis						
	1) Consistency and attitude					
		①Consistency with higher plan		Y	Y	Y
		②Attitude toward the project		Y	Y	Y
		③Preparedness		N	Y	Y
		④Project-specific item (optional)		N	N	N
	2)Project risk					
		①Financial feasibility		Y	Y	Y
		②Environmental impact		Y	Y	Y
		③Project-specific item (optional)		N	N	N
	3)Project-specific factor (optional)			N	N	Y
3.Balanced regional development						
	1)Regional backwardness analysis			Y	Y	Y
	2)Regional economic impact			Y	Y	Y
Number of pieces of data			167	114	45	8

Note: Y (accepted as sub-appraisal factor), N (not accepted as sub-appraisal factor)

[30] "The excepted values should be at least 5 to ensure that the Chi-squared distribution provides an adequate approximation of the sampling distribution" (Keller, 2011, p. 610)

2) The effect of the current weighting methodology on RBS decisions

We applied different weighting methodology to past data to obtain the RBS results set out in Table 6-11. According to the RBS results, if we change the weight from the original one to a new one fixed by the new weighting methodology, the RBS decisions on between 15 and 21 projects may be changed. Considering the total number of projects (167) which can be analyzed in this way against the total number of projects between 2006 and 2010, the ratio of projects where RBS decisions are changed reaches 13 per cent. When it comes to the direction of change, there is big difference between changing from 'recommended' to 'not-recommended' and change in the opposite direction. In Case 1, in 16 out of 17 projects the RBS decision changed from 'recommended' to 'not-recommended', whereas only one project changed in the opposite direction. As seen from the table, the other cases have same results.

Table 6-11: Change of RBS results according to the weighting of appraisal sub-factors

(Unit: number of projects, %)

		Current methodology	Same weighting methodology			
			Case 1 (46, 31, 23)	Case 2 (45, 25, 30)	Case 3 (50, 25, 25)	Case 4 (40, 35, 25)
Change of RBS	recommended→ not-recommended (A)	-	**16**	18	21	10
	Not-recommended→ recommended (B)	-	1	3	0	5
Number of changes (C)		-	17	21	21	15
Total number (D)			167	167	167	167
Changing ratio (C/D)			10.4%	12.8%	12.8%	9.1%
A/C			94.1%	85.7%	100.0%	66.7%
B/C			5.9%	14.3%	0.0%	33.3%

From this analysis, we found that change to the weighting structure for appraisal sub-factors can have a profound impact on RBS decisions (AHP≥0.5 or not). Furthermore, as there was asymmetry between the number of changes from 'recommended' to 'not-recommended' and the number from 'not-recommended' to 'recommended' projects, it may be supposed that policy analysts manipulate the weighting to change the 'not-recommended' projects which lie below the critical score (AHP = 0.5) into recommended projects. This result may contrast with the expected role of policy analysts as objective technicians or gate-keepers who value neutrality.

3) The features of projects on which RBS decisions were changed

As the RBS decisions for 16 projects were changed by changing the weighting of appraisal sub-factors, it might be supposed that these projects were appraised as 'recommended' due to the judgment of policy analysts on their weighting. For this reason, the attitude of policy analysts towards projects and how policy analysts behaved here can be examined by analyzing the features of these 16 projects.

Although the total number of projects on which the RBS decision could be changed by changing the weighting was 17 (case 1), considering the interest of the research in the reasons why policy analysts' behaviour might contrast with their expected role as gate keepers in the PRP process, there were only 16 projects on which the decision changed from 'recommended' to 'not-recommended' and that could be analyzed in this study.
Considering these results of RBS, we could argue that the projects that were sensitive to changes in method represented an area where calculation had been 'massaged' to affect the RBS results.

In this study, drawing on the literature review and the overview of Korean PRP, we raised issues related to how policy analysts could massage the RBS results. Firstly, as a policy factor is composed of qualitative judgments which are judged subjectively by policy analysts (KDI 2008), it may be supposed that policy analysts want the projects which obtain the highest scores for their policy factors to be successful in their PRP. In order to test this hypothesis, the difference between the appraisal sub-factor scores of the 16 projects on which RBS decisions were changed by the weighting given to appraisal sub-factors and those of the other projects will be analyzed. Secondly, as policy appraisal factors are the product of qualitative judgments which are made subjectively by policy analysts, it may be supposed that policy analysts give as great a weight to policy as is allowed by the permitted range if they want a project which they favor to be successful in its PRP. In order to analyze this hypothesis, the difference in the weights given to the appraisal sub-factors of the 16 projects and those given to those of the other projects will be analyzed. Thirdly, according to the PRP guidelines, the weighting process is separate from the scoring process (KDI 2008). From this point of view, it may be supposed that the association between weight and score for appraisal sub-factors is weak. However, it is likely that policy analysts manipulate the weighting of projects which they favour in order to affect the results of their AHP score. In order to analyze such behaviour in relation to the 16 projects on which RBS decisions were changed by changing the weights of appraisal sub-factors, there should be comparative analysis of the weights given to the appraisal sub-factors of the 16 projects and those given to the appraisal sub-factors of the other projects.

The scores of the policy factors of the 16 projects are larger than those of the other projects

From the results of analysis, we found that there is no significant difference between the policy scores of the 16 projects and the policy scores of the others. Table 6-12 shows a comparison of the mean scores of the sub-appraisal factors of the 16 projects on which RBS decisions were changed by changing the weighting of sub-appraisal factors with the scores of the other projects. As seen from the table, the economic factor scores of the 16 projects were lower than those of the other projects at a significance level of 0.01. However, the differences in the policy and regional factor scores were not clear.

Table 6-12: Comparison of the scores of the 16 projects with those of the others

	Mean			t-value
	16 projects (A)	Other projects (B)	Difference (A-B)	
B/C score[31]	**0.3936**	**0.4647**	**- 0.0709**	**- 2.697*****
Policy score[32]	2.6625	2.6361	0.0264	0.199
Regional score[33]	0.9506	1.0381	- 0.0875	1.094

The weights of the policy factors of the 16 projects are greater than those of the others

The results of the analysis show that there is a significant difference in the weighting of policy factors between the 16 projects and the others. Table 6-13 shows a comparison of the mean weight scores for appraisal sub-factors between the 16 projects on which RBS

[31] H_0 : There is no significant difference between the 16 projects and other projects in B/C score
[32] H_0 : There is no significant difference between the 16 projects and other projects in policy score
[33] H_0 : There is no significant difference between the 16 projects and other projects in regional score

decisions were changed by changing the weighting of appraisal sub-factors and the other projects. As seen from the table, the mean weights of economic and policy factors for the 16 projects and the other projects differ at the significance levels of 0.1 and 0.01 respectively. When it comes to the weights of the economic factors of the 16 projects, these are lower than those of the other projects. On the other hand, the weights of the policy factors of the 16 projects are higher than those of the other projects.

Table 6-13: Comparison of the weights of the 16 projects and those of the others

	Mean			t-value
	16 projects (A)	Other projects (B)	Difference (A-B)	
Weight for economic factors[34]	**0.4594**	**0.4701**	**-0.0107**	**-2.158***
Weight for policy factors[35]	**0.3294**	**0.3202**	**0.0092**	**2.2061*****
Weight for regional factors[36]	0.2100	0.2095	0.0005	0.091

****P<0.01, **P<0.05, *P<0.1*

From these results, we found that policy analysts give more weight to policy factors, which can be determined by their own subjective opinion, and less to economic factors, which can be produced through objective measurement, in order to ensure the success of projects which might be appraised as 'not-recommended' if they were given the same weight as other projects.

[34] H_0: There is no significant difference between the 16 projects and other projects in weight for economic factor

[35] H_0: There is no significant difference between the 16 projects and other projects in weight for policy factor

[36] H_0: There is no significant difference between the 16 projects and other projects in weight for regional factor

Scores and weights are more closely associated with each other in the 16 projects than in the others

The results of the analysis show that the score and weight for each sub-appraisal factor were more associated with each other in the 16 projects than in the others, at the significance level 0.01. Table 6-14 shows the results of correlation analysis between the scores and weights of sub-appraisal factors. For the 16 projects, all three appraisal sub-factors had a statistically significant relationship with their weight, at the significance level of 0.01 (for policy and regional factors) and 0.0 (for economic factors). On the other hand, as for all projects, although the policy and regional scores had statistically significant positive relationships with their weight, at the significance level of 0.01, the relationship between the economic factor score and weight is not clear. When it comes to the strength of the relationship, as the correlation coefficients between the scores and weights of the 16 projects are higher than those of the other projects, it may be supposed that the relationship between the score and weight of each appraisal sub-factor of the 16 projects is stronger than that of other projects. In particular, policy factors had a much stronger relationship between score and weight in the 16 projects (0.566) than in the others projects (0.335).

Table 6-14: Correlation between score and weight

	Pearson correlation	
	Other projects	**16 projects**
Economic score vs economic weight[37]	.112	**.480***
Policy score vs policy weight[38]	**.335*****	**.566*****
Regional score vs regional weight[39]	**.482*****	**.610*****

[37] H_0: There is no significant correlation between score and weight for economic factor
[38] H_0: There is no significant correlation between score and weight for policy factor
[39] H_0: There is no significant correlation between score and weight for regional factor

From these results, we can see that, although the weighting and scoring processes are separate from each other, a policy analyst might consider the scores and weights of appraisal sub-factors at the same time during the appraisal of some projects.

6.3.2. The results for Research Sub-Question 2-②

What are the views of stakeholders in the PRP process on whether the current PRP methodology leads to appropriate RBS - and what are the reasons for these views?

6.3.2.1. Exploring the opinions of stakeholders who took part in the PRP process about the discretization of ratio through the nine-point scale

In the previous analysis for Research Sub-Question 2-①, we found that the B/C ratio played an important role in RBS decisions, due to discretization of the ratio on the current nine-point scale. In this section, the appropriateness of this effect of the nine-point scale on the B/C ratio is explored through the opinion of each stakeholder.

1) Opinions about the discretization of ratio through the nine-point scale

In the interviews, we found that the number of stakeholders who had concerns about the nine-point scale and the number of those who did not were similar. Table 6-15 shows the opinion of each stakeholder on the appropriateness of using the nine-point scale for converting the B/C ratio into an economic score. As seen in Table, 18 out of 32 interviewees were concerned about the current nine-point scale, and the other 14 were not concerned. Secondly, according to the interviews, most policy analysts were not concerned about the current nine-point scale methodology, but most other stakeholders were concerned about the current nine-point scale methodology. As seen in the table, 11 out of 14 policy analysts were not concerned about the nine-point scale methodology

(transportation: four out of six; others: seven out of eight). On the other hand, 15 out of the 18 other stakeholders were concerned about the nine-point scale methodology. Lastly, there is a small difference in opinion about the current methodology between those who take part in PRP on transportation projects and those who take part in PRP on other projects. A large percentage of policy analysts and spenders (72.7 per cent, eight out of 11) who took part in PRP on other projects were not concerned about the current nine-point scale methodology, while a lower percentage of policy analysts and spenders who took part in PRP on transportation projects (36.4 per cent, four out of 11) were not concerned.

Table 6-15: Concern about using the nine-point scale methodology

(Unit: number of person)

		Concerned	Not concerned	Total
Transportation projects				
SPENDER	Agent	2	0	2
	Line-ministry	3	0	3
	Sub-total	**5**	0	5
POLICY ANALYST	KDI analyst	1	1	2
	Professor	1	1	2
	Private company	0	2	2
	Sub-total	2	**4**	6
	TOTAL	7	4	11
Others projects				
SPENDER	Local government	0	0	0
	Line-ministry	2	1	3
	Sub-total	**2**	1	3
POLICY ANALYST	KDI analyst	1	2	3
	Professor	0	3	3
	Private company	0	2	2
	Sub-total	1	**7**	8
	TOTAL	3	8	11
MOSF		5	1	6
EXPERT		3	1	4
TOTAL		18	14	32

2) Exploring the reasons for opposition to the nine-point scale

According to the interviews, the reasons for concern about the discretization of ratio on the nine-point scale can be divided roughly into three: enlargement of the effect of some specific ranges of the B/C ratio; inaccuracy of the B/C ratio; and too much difference within the scale. As seen in Table 6-16, interviewees stated that as the B/C ratio cannot be estimated exactly, there may be a problem of enlarging the ratio's effect on the AHP score by using the nine-point scale methodology (three spenders and one policy analyst). Furthermore, some spenders raised the problem of enlarging the effect of the B/C ratio on the AHP score in some specific range other than that of the B/C ratio (three spenders). On the other hand, some policy analysts stated that although some discretization of ratio on scales is necessary in appraisal, 17 different points on a scale may be too much (two policy analysts). A line-ministry official and a policy analyst who were concerned about the asymmetry of the nine-point scale said:

> *I think that as the B/C ratio can also be influenced by the policy analyst's inclination, there is a problem of enlarging the effect of a specific range of B/C on the AHP score. But it may be fine to use a nine-point scale methodology in the PRP process, on condition that the B/C can be estimated objectively (Line-ministry official, interviewed 26th Nov 2012)*

> *I think that as the B/C ratio is produced by objective results which are estimated through numerical data, it should be reflected correctly. For this reason, the difference between the scale points should be converted correctly into an economic factor score… (Policy analyst, interviewed 4th Dec 2012)*

Secondly, there is similar concern about the current methodology among those who took part in PRP on transportation projects and other projects. Lastly unlike other stakeholders, one MOSF official was worried about the abuse of the discretization of

ratio of the nine-point scale methodology by spenders and policy analysts in his capacity as manager of the PRP methodology. This MOSF official said:

> *If it is possible for policy analysts and spenders to raise the AHP score through using the* asymmetry of the nine-point scale, they may try to do so in order to promote their favored projects…(*MOSF official, interviewed 1st Dec 2012)*

Table 6-16: Reasons for concern about the current nine-point scale

(Unit: number of coding and person)

	Reasons for concern
Transportation	
SPENDER	▪ Although the B/C ratio cannot be estimated exactly, the nine-point scale enlarges its effect on the AHP score(2) ▪ There is a problem of enlarging the effect of the B/C ratio on the AHP score in some specific ranges of B/C (2)
POLICY ANALYST	▪ Although the B/C ratio cannot be estimated exactly, the nine-point scale enlarges the effect of the B/C ratio on the AHP score (1) ▪ Although some discretization of ratios on scales is necessary for appraisal, 17 different points on a scale may be too much. (2)
Others	
SPENDER	▪ Although the B/C ratio cannot be estimated exactly, the nine-point scale enlarges its effect on the AHP score (1) ▪ There is a problem of enlarging the effect of the B/C ratio on the AHP score in some specific ranges of B/C (1)
POLICY ANALYST	▪ As the B/C is objective data, it should be reflected correctly(1)
MOSF	▪ Concern about the abuse of the asymmetry of the nine-point scale methodology by spenders (2) ▪ Although the B/C ratio cannot be estimated exactly, the nine-point scale enlarges its effect on the AHP score (2)
EXPERT	▪ Although the B/C ratio cannot be estimated exactly, the nine-point scale enlarges its effect on the AHP score (2) ▪ There is a problem of enlarging the effect of the B/C ratio on the AHP score in some specific range of B/C (1)

3) Exploring the reasons for supporting the nine-point scale

According to the interviews, the reasons for not being concerned about the discretization of ratio on the nine-point scale can be divided roughly into two: an increase in the possibility of distinguishing between the projects which gather around the ratio B/C = 1; and an increase in the impact of the B/C ratio, which is produced objectively, on the AHP score. As seen in Table 6-17, most of the interviewees who took part in PRP on transportation projects stated that the main reason for not being concerned about the discretization of ratio on the nine-point scale was, 'The nine-point scale enables the PRP system to better distinguish between the projects which gather around the ratio B/C = 1 (14 out of 17 interviewees). On the other hand, some interviewees considered 'the increase in the impact of the B/C ratio, which is produced objectively, on AHP scores' as an important reason as well (three out of 17 interviewees).

> *As RBS decisions on large-scale projects are important in the PRP process, the asymmetry of the nine-point scale which occurs around the B/C ratio 1 may not be a big problem. For example, as the weighting range of the economic factor is above 45 per cent, projects which have a B/C ratio much more than 1 may easily be appraised as 'recommended'. On the other hand, projects whose B/C ratio is much less than 1 may not be appraised as 'recommended'. For these reason,* the possibility of distinguishing between the projects which gather around B/C = 1 is important in the PRP process… *(Policy analyst, interviewed on 3rd Dec 2012).*

> *Contrary to the other two sub-factors, which are appraised through subjective judgment, the B/C ratio is estimated through objective data. For this reason, as the B/C ratio may be a more objective sub-appraisal factor than the other two factors, it is better to increase the impact of the B/C ratio on RBS decisions… (Spender,*

interviewed 27th Nov, 2012)

Secondly, there was some difference in opinion about the reasons for not being concerned about the current methodology between those who had taken part in PRP on transportation projects and those who had participated in PRP on other projects. The policy analysts and spenders who had taken part in PRP on transportation projects all stated that the main reason for not being concerned about the asymmetry produced by the nine-point scale was because 'the nine-point scale enables the PRP system to distinguish better between the projects which gather around B/C = 1, whilst the policy analysts and spenders who had taken part in PRP on other projects considered that 'the increase in the impact of the B/C ratio, which is produced objectively, on the AHP score' was also an important reason.

Table 6-17: Reasons for not being concerned about the current nine-point scale

(Unit: number of codings and persons)

	Reasons for not being concerned
Transportation	
SPENDER	▪Increased possibility of distinguishing between projects which gather around B/C = 1 (2)
POLICY ANALYST	▪Increased possibility of distinguishing between projects which gather around B/C = 1 (2)
Other Projects	
SPENDER	▪Increased possibility of distinguishing between projects which gather around B/C = 1 (1) ▪Increased impact of B/C ratio, which is produced objectively, on AHP scores (1)
POLICY ANALYST	▪Increased possibility of distinguishing between projects which gather around B/C = 1 (3) ▪Increased impact of B/C ratio, which is produced objectively, on AHP scores (2)

MOSF	▪Increased possibility of distinguishing between projects which gather around B/C = 1 (3)
EXPERT	▪Increased possibility of distinguishing between projects which gather around B/C= 1 (3)

6.3.2.2. Exploring the opinions of stakeholders who took part in the PRP process about using the current weighting methodology in PRP

In the previous analysis for Research Sub-Question 2-①, we found that the weighting methodology played an important role in RBS decisions, even though there might be the same score for sub-appraisal factors. In this section, the appropriateness of this effect of the current weighting methodology on RBS decisions is explored through the opinion of each stakeholder.

1) Opinions on using the current weighting methodology in PRP

From the interviews, we found that regardless of project type, most spenders were against the current weighting methodology and most policy analysts, experts and MOSF officials were for it. As seen in Table 6-18, eight out of 10 spenders were concerned about the current weighting methodology (transportation: three out of four; other projects: five out of six). However, 10 out of 12 policy analysts were not concerned about the current weighting methodology (transportation: five out of six; others: five out of six).

Secondly, according to the interviews, most experts and MOSF officials were not concerned about the current weighting methodology. As see in the table, five out of

seven interviewees who were involved in PRP on large-scale projects were for the current methodology and the other two interviewees were against the current methodology.

Table 6-18: Preferences of each type of stakeholder on the current weighting methodology

(Unit: number of persons)

		Preference on existing weighting methodology		
		Against	For	Total
Transportation project				
SPENDER	Agent (public company)	0	1	1
	Line-ministry	3	0	3
	Sub-total	3	1	4
POLICY ANALYST	KDI analyst	0	2	2
	Professor	1	2	3
	Private company	0	1	1
	Sub-total	1	5	6
TOTAL		4	6	10
Other projects				
SPENDER	Local government	3	0	3
	Line-ministry	2	1	3
	Sub-total	5	1	6
POLICY ANALYST	KDI analyst	0	2	2
	Professor	0	3	3
	Private company	1	0	1
	Sub-total	1	5	**6**
TOTAL		6	6	12
MOSF		2	4	6
EXPERT		0	1	1
TOTAL		2	5	7

2) Exploring reasons for supporting the current weighting methodology

According to the interviews, the main reason for supporting the current weighting methodology is that policy analysts can reflect their own judgments in the project through manipulating the weighting of appraisal sub-factors. As seen in Table 6-19, 15 out of 16 interviewees stated that they were not concerned about the current weighting methodology, because it enabled policy analysts to reflect their subjective judgments in the projects. One professor stated that, as using discretion is restricted by the PRP guidelines, there is no big problem in the current weighting methodology.

In order to reflect the judgment of experts on the characteristic of projects, I think that it is important to keep the current weighting methodology, where policy analysts can reflect their judgment through manipulating the weighting of appraisal sub-factors. I think that the most important thing is to reveal the results of weighting to the public. If they are not revealed to the public, it is useless to have one fixed weighting methodology, because in that case, policy analysts may manipulate the scores …. (Policy analyst, interviewed on 1st Dec 2012).

As the permitted range of each weight given to appraisal sub-factors is restricted by the PRP guidelines, setting the weighting within the permitted range can be kept under control (Policy analysts, interviewed on 11th Dec 2012).

As the aim of adopting the PRP methodology for budgetary decisions is to use the expert judgment that is the result of expertise, the current weighting methodology, which enables policy analysts to reflect their judgment in RBS decisions, may be reasonable…(expert, interviewed on 17th Dec 2012).

Table 6-19: Reasons for supporting the existing weighting methodology

(Unit: number of codings and persons)

	Reasons for supporting weighting methodology
Transportation projects	
SPENDER	Reflects analyst's judgement on the project (1)
POLICY ANALYSTS	Reflects analyst's judgement on the project (4)
Other projects	
SPENDER	Reflects analyst's judgement on the project (1)
POLICY ANALYSTS	Reflects analyst's judgement on the project (2) Discretion is restricted by guidelines (range) (1)
MOSF	Reflects analyst's judgement on the project (4)
EXPERTS	Reflect analyst's judgement on the project (3)

3) Exploring the reasons for opposing the current weighting methodology

From the interviews, we found that most interviewees who opposed the current weighting methodology considered the fact that it gave too much discretion to analysts to be its main disadvantage; and local government officials who were involved in other projects considered reduction of the predictability of PRP result for spenders to be the main problem.

As seen in Table 6-20, eight out of 10 interviewees stated that they were concerned about the current weighting methodology because it gave too much discretionary power to analysts. One the other hand, stakeholders who were involved in other projects considered the decrease in predictability for spenders of PRP results as the important reason for their opposition to the current weighting methodology.

The problem is that the decision on RBS is not made by government but by policy analysts, who do not have responsibility for the national policy on large-scale projects. The current weighting methodology gives too much power to policy analysts, who do not have responsibility for the final results of the project process… (Line-ministry official, interviewed on 26th Nov 2012)

If the results of AHP can be different from the scores of appraisal sub-factors according to the weighting set on appraisal sub-factors, the predictability of the results of PRP may be reduced, and this may be a problem for local government officers seeking to make a proper response to the project process…(Local government official, interviewed on 14th Dec 2012).

Table 6-20: Reasons for opposing the existing weighting methodology

(Unit: number of codings and persons)

	Reasons for opposing the existing weighting methodology
Transportation projects	
SPENDERS	Gives too much discretion to analysts (2)
Other projects	
SPENDERS	Gives too much discretion to analysts (3) Decreases the predictability for spenders of PRP results (2)
POLICY ANALYST	Gives too much discretion to analysts (1)
MOSF	Gives too much discretion to analysts (2)

6.3.3. The results for Research Sub-Question 2-③, 2-④

What would be the effect of possible alternative PRP methodologies on RBS decisions? (2-③) How desirable do different stakeholders think these alternative PRP methodologies would be? (2-④)

From previous analysis for the research sub-questions, we learned the effects of the current PRP methodology on RBS decisions and the opinions of stakeholders on the current methodology. Furthermore, according to the interview results and previous research, it is possible to propose several alternatives to the current PRP methodology according to a joint alternative methodology of scale (balanced scale) and weighting, such as that which gives the same weight to all projects and the same weighting within project types. In this section, we will analysis the impact of proposed alternative methodology on RBS decisions.

6.3.3.1. Analysis methods for Research Sub-Question 2-③, 2-④

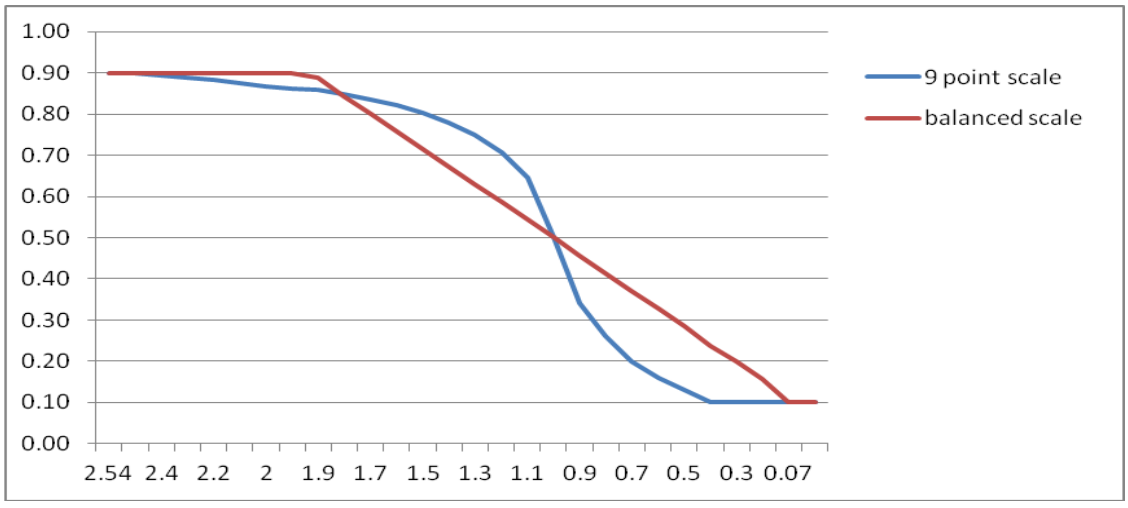
1) Alternatives to the current scale and weighting methodology

(1) Alternative scale methodology: balanced scale

As seen in the previous section (6.3.1.1.), the balanced scale means that the scale has equalized distances between the points on it and there are five candidate cases according to their range. Considering the similar effect of the B/C ratio on RBS decisions in all the cases, any case can be used for analysis of the balanced scale methodology. In this section, Case 2 (0.07 and 1.93) is used (see Table 6-6 and 6-21).

Table 6-21: Comparing the balanced scale (0.07-1.93) methodology and the current methodology

B/C ratio	Economic score	
	nine-point scale	Balanced scale(0.07-1.93)
2.54	0.90	0.9
2	0.87	0.90
1.93	0.86	0.90
1.9	0.86	0.89
1.8	0.85	0.84
1.7	0.84	0.80
1.6	0.82	0.76
1.5	0.80	0.72
1.4	0.78	0.67
1.3	0.75	0.63
1.2	0.71	0.59
1.1	0.65	0.54
1	0.5	0.50
0.9	0.34	0.46
0.8	0.26	0.41
0.7	0.2	0.37
0.6	0.16	0.33
0.5	0.13	0.28
0.39	0.1	0.24
0.3	0.1	0.20
0.2	0.1	0.16
0.07	0.1	0.10
0.1	0.1	0.10



(2) Alternative weighting methodologies

Previous research suggested two alternatives to the current weighting methodology: setting the same weighting for each project; and setting the same weighting within the same project type while having different weightings for each type.

First alternative: the same weighting within the same project type

One of the alternative weighting methodologies is for policy analysts to set the same weighting within same project type. This means setting different weightings for each project type, but the same weighting for projects which are classified as being of the same type. The important thing for this option is how each project is classified into a type and what the proper weighting for each type is. It is important to recognize that projects can be divided into seven types: road, railroad, harbor, airport, water resource, building and civil engineering. Furthermore, they can be divided into two categories – transportation, and others – according to PRP guidelines (see Table 6-22). Thus, the simplest and most significant way to divide project types is by classifying them into two categories: transportation and others.

Table 6-22: Types and categories of projects

Category of project types	Types of project	Number
Transportation	Road	97
	Railroad	29
	Harbor, airport	15
	Sub total	141
Others	Water resource	17
	Building	36
	Civil engineering	10
	Sub total	63
Total		204

When it comes to setting weightings for each type of project, Table 6-23 shows the results of weightings based on appraisal sub-factors for projects which were subjected to PRP between 2006 and 2010. According to the data (2006-2010) from PRP results, it can be taken that there is a difference of weighting for policy factors and regional factors between transportation projects and other projects at the significance level of 0.000 and 0.028 respectively. On the other hand, it cannot be taken that there is any difference in weighting for economic factors between transportation projects and other projects (see Table 6-23). For these reason, it is necessary to analyze the sensitivity of PRP results to changes in the weighting set, with two different fixed weightings set according to project type: transportation and other types. Furthermore, the weightings to be set for each project type can be produced by means of weighing each type of project: transportation projects (economic factor: 0.4704, policy: 0.3179, regional: 0.2116), and others (economic factor: 0.4671, policy: 0.3281, regional: 0.2041).

Table 6-23: Differences in weights of projects according to their type

Sub-appraisal factors	Project types	Mean	Std. Deviation	t-value	Sig. (2-tailed)
Economic factor[40]	Transportation	.4704	.01972	1.137	.257
	Others	.4671	.01794		
Policy factor[41]	Transportation	**.3179**	.01658	-4.062	**.000**
	Others	**.3281**	.01664		
Regional factor[42]	Transportation	**.2116**	.02227	2.218	**.028**
	Others	**.2041**	.02241		

[40] H_0: There is no significant difference between the average economic factor score for transportation projects and those for other projects.
[41] H_0: There is no significant difference between the average policy factor score for transportation projects and those for other projects.
[42] H_0: There is no significant difference between the average regional factor score for transportation projects and those for other projects.

Second alternative: the same weighting for each project

The other alternative to the current weighting methodology is to use the same weighting for each project. Although there are four alternative cases for setting the same weighting based on appraisal sub-factors (see Table 6-9), it is important to recognize that the implications for RBS decisions might be similar (see Table 6-11). In this analysis, average weight by guideline (Case 1 in Table 6-9) can be adopted as an alternative weighting methodology.

2) Possible joint alternative methodology to the current methodology, and its meaning

Considering the alternative methodology for scoring and weighting, five types of alternative to the current PRP methodology can be created (see Table 6-24).

Table 6-24: Possible alternatives to the current methodology

<table>
<tr><td colspan="3" rowspan="2"></td><td colspan="2">Scale methodology for B/C ratio</td></tr>
<tr><td>nine-point scale</td><td>Balanced scale (0.07-1.92, 1%)</td></tr>
<tr><td rowspan="3">Weighting methodology</td><td colspan="2">Different weight for projects</td><td>Current methodology</td><td>Type 1</td></tr>
<tr><td rowspan="2">Same weight for</td><td>Within same project type</td><td>Type 2</td><td>Type 3</td></tr>
<tr><td>All projects</td><td>Type 4</td><td>Type 5</td></tr>
</table>

Current methodology: nine-point scale methodology + different weight for each project

In this methodology, the nine-point scale is used for converting the B/C ratio into an economic score and policy analysts set the different weightings based on appraisal sub-factors between the projects, according to their subjective judgment.

Type 1: balanced scale methodology + different weight for each project

In this type, the balanced scale is used for converting the B/C ratio into an economic score and policy analysts set the different weightings based on appraisal sub-factors between the projects, according to their own subjective judgment.

Type 2: nine-point scale methodology + same weight for within same type

In this type, the nine-point scale is used for converting the B/C ratio into an economic score.

However, policy analysts set the weighting according to fixed weightings and have no discretion. In this methodology, the fixed weighting is composed of different weightings based on appraisal sub-factors between the types of projects and the same weightings based on appraisal sub-factors within the same type of projects.

Type 3: balanced scale methodology + same weight for within same type

In this type, the balanced scale is used for converting the B/C ratio into an economic score.

However, policy analysts set the weighting according to fixed weightings and have no discretion. The fixed weightings are composed as in Type 2.

Type 4: nine-point scale methodology + same weight for each project

In this type, the nine-point scale is used for converting the B/C ratio into an economic score.

However, policy analysts set the weighting according to fixed weightings and have no discretion. In this type, all projects have the same weighting.

Type 5: balanced scale methodology + same weight for each project

In this type, the balanced scale is used for converting the B/C ratio into an economic score and the weighting methodology is the same as for Type 4.

6.3.3.2. What would be the effect of possible alternative PRP methodologies on RBS decisions? (Research Sub-Question 2-③)

According to the results of analysis (see Table 6-25), when their scoring and weighting methodologies were changed, between 3.4 per cent and 10.2 per cent of projects received different RBS decisions compared with those given under the current weighting and scoring methodology. As these five alternative methodologies are derived from a combination of the balanced scale methodology and the alternative weighting methodology, the effect of the five alternative methodologies can be identified through analysis of the effect of the balanced scale methodology and that of the alternative weighting methodology respectively.

Firstly, let us analyze the effect of the balanced scale on the RBS decision. As seen in Table 6-25, as the balanced scale reduces the impact of the B/C ratio on the AHP score

and RBS decision in the critical range (0.8<B/C<1.2) (see Table 6-21), some projects which have a relatively low B/C ratio can have their RBS decision changed from 'not-recommended' to 'recommended' under the balanced scale methodology. As the Type 1 methodology is composed of a balanced scale methodology and the current weighting methodology, the effect of the balanced scale methodology on the RBS decision can be analyzed by comparing the results of the current methodology with those of the Type 1 methodology. As seen in the table, when the scoring methodology was changed into a balanced scale methodology with a different weighting for each project (Type 1), although seven projects had their RBS decision changed from 'not-recommended' to 'recommended', no project had its RBS decision changed from 'recommended' to 'not-recommended'. Considering the means of the B/C ratio, the policy factor score and the regional score for these seven projects are 0.62, 2.56, and 1.50, and the means of these for all the projects are 1.06, 2.64, 1.03, it may be supposed that the balanced scale methodology may help projects which have a relatively high regional factor score, even though their B/C ratio and policy factor score are relatively low, to be successful in their PRP.

Secondly, let us analyze the effect on RBS decisions of applying the same weighting to projects. Considering the policy analysts' behaviour in promoting their own favorite projects through manipulating the weighting set, it might be more difficult for policy analysts to promote their own favorite projects if the same weighting is set for each type of project or each project within a type. As the Type 4 methodology is composed of a nine-point scale and the same weighting for each project, the effect of having the same weighting on RBS decisions can be analyzed by comparing the results produced by the

current methodology with those produced by the Type 4 methodology. As seen in the table, when the weighting methodology was changed into the same methodology set under the nine-point scale methodology (Type 4), although 16 projects had their RBS decisions changed from 'recommended' to 'not-recommended', only one project had its RBS decision changed from 'not-recommended' to 'recommended'. Considering the means of the B/C ratio, policy factor score and regional score for the 16 projects are 0.88, 2.66, 0.95 and the means of these for all the projects are 1.06, 2.64, 1.03, it may be supposed that having the same weighting methodology may make projects which have a relatively high policy factor score and a relatively low regional and economic factor score fail their PRP.

When it comes to the joint effect of alternative PRP methodologies, firstly, an alternative PRP methodology may prevent projects which have a relatively high policy score and a relatively low B/C ratio and regional score from being successful in the PRP process. According to the results of the analysis, a maximum of 16 projects' RBS decisions were changed from 'recommended' to 'not-recommended' by changing the PRP methodology. We found that the means of these projects' policy scores were higher than those of all the projects, and the means of the B/C ratio and the regional score were lower than those of all the projects. An alternative PRP methodology might help projects which had a relatively high regional score and a relatively low B/C ratio and policy score to be successful in the PRP process. According to the results of analysis, a maximum of eight projects' decisions were changed from 'not-recommended' to 'recommended' by changing the PRP methodology. We found that the means of the

regional scores of these projects were higher than those of all the projects and the means of the B/C ratio and policy score were lower than those of all the projects.

Table 6-25: Changing RBS decisions by changing the PRP methodology

		Alternative methodology				
		Type 1	Type 2	Type 3	Type 4	Type 5
Methodology property	*Scoring*	*Balanced scale*	*Nine-point scale*	*Balanced scale*	*Nine-point scale*	*Balanced scale*
	Weighting	*Different for projects*	*Same for type*	*Same for type*	*Same for projects*	*Same for projects*
Change of RBS decision	'recommended' → 'not-recommended' (A)	**0**	**13**	**3**	**16**	**4**
	B/C score* (1.06)**	-	*0.86*	*0.91*	*0.88*	*0.95*
	Policy score* (2.64)**	-	*2.78*	*2.92*	***2.66***	*2.64*
	Regional score* (1.03)**	-	*1.02*	*0.80*	*0.95*	*0.78*
	'not-recommended' → 'recommended' (B)	**7**	**1**	**9**	**1**	**8**
	B/C score	*0.62*	*0.76*	*0.71*	*0.77*	*0.68*
	Policy score	*2.56*	*2.20*	*2.44*	*2.55*	*2.47*
	Regional score	***1.50***	*1.37*	*1.34*	*1.59*	*1.42*
Number of change total (C)		7(7)	14(Δ12)	12(6)	17(Δ15)	12(4)
Total number (D)		204	167	167	167	167
Changing ratio (C/D)		3.4	8.4	7.2	10.2	7.2
A/C		0.0	92.9	25.0	94.1	33.3
B/C		100.0	7.1	75.0	5.9	66.7

*Average score of projects for which RBS decisions were changed.

** Average score of all projects (204)

6.3.3.3. How desirable do different stakeholders think these alternative PRP methodologies would be? (Research Sub-Question 2-④)

Table 6-26 shows the opinions of stakeholders on their favorite policy alternative to the current PRP methodology. In the second interview, we found that the stakeholders' favorite candidates for PRP methodology were, in order, Type 3 (balanced scale methodology + same weight for projects according to their type), Type 1 (balanced scale methodology + different weight for each project), Type 2 (nine-point scale methodology + same weight for projects according to their type) and current methodology (nine-point scale methodology + different weight for each project). As seen in Table 6-26, 17 interviewees out of 32 considered Type 3, which is composed of balanced scale score methodology and different weightings set for each project type while same weightings are set for projects within the same project type, as their favorite alternative for PRP methodology. Eight interviewees stated that their favorite alternative to current PRP methodology was Type 1, which is composed of balanced scale score methodology and different weightings set for each project, as in current weighting methodology. Four interviewees considered Type 2 to be their favorite policy alternative for PRP methodology, while three interviewees argued that the current methodology was their favorite PRP methodology.

With respect to the different opinions of stakeholders, we found that as concerned weighting methodology, most spenders (seven out of nine) preferred the same weighting for projects within the same project type (different weighting set for each project type, but the same weighting set for projects within the same project type), while

all KDI analysts considered the current weighting methodology to be their favorite. The other stakeholders similarly considered the current weighting methodology and the same weighting for projects within the same project type as their favorite. As for scale methodology, we found that most stakeholders (25 out of 32) stated that balanced scale methodology was their favorite score methodology. Furthermore, these opinions of stakeholders were similar to each other according to their types (eight out of nine spenders, 10 out of 12 policy analysts, and seven MOSF and experts out of 11).

Table 6-26: Stakeholders' favorite alternatives to current PRP methodology

(Unit: number of persons)

		Current	Type 1	Type 2	Type 3	TOTAL
		Nine-point scale	*Balanced scale*	*Nine-point scale*	*Balanced scale*	
		Different for projects	*Different for projects*	*Same for type*	*Same for type*	
Spenders	Local government	0	2	0	0	2
	Agent	0	0	1	2	3
	Line-ministry	0	0	0	4	4
	Sub-total	**0**	2	1	**6**	9
Policy analysis	KDI analyst	**2**	**2**	0	0	4
	Professor	0	1	0	3	4
	Private company	0	1	0	3	4
	Sub-total	2	**4**	0	**6**	12
MOSF		0	1	2	3	6
Expert		2	1	0	2	5
TOTAL		4	8	3	**17**	32

With respect to the reason for selecting their favorite policy alternatives, the stakeholders gave the following statements.

Reasons for adopting Type 1

According to the second interview results, there are two reasons for adopting Type 1 methodology. Firstly, as the B/C ratio can be changed according to changes in the hypothesis for creating the B/C ratio, the exaggeration of the differences among projects which have a similar B/C ratio might make it difficult to increase the appropriateness of PRP. For this reason, a balanced scale could be a good alternative to current scale methodology. With respect to the weighting methodology, as there are different characteristics among the projects, current weighting methodology enables policy analysts to reflect these differences by applying different weighting sets for each project.

> *As the B/C ratio can be changed according to assumptions about the B/C analysis, rather than ignoring these, it might create problems to exaggerate the effect of differences around B/C ratio = 1 when policy analysts produce AHP scores. With respect to weighting methodology, as the relative importance of sub-appraisal factors in projects can differ among projects, current methodology might be better than alternative weighting methodology in which policy analysts set the same weighting for each project. For these reasons I prefer Type 1 ….(Policy analyst, 2nd interview, Nov 2013)*

Reasons for adopting Type 2

According to the second interview results, there are two reasons for adopting Type 2 methodology. Firstly, as many projects have a similar B/C ratio around B/C = 1, current nine-point scale methodology might be better to help distinguish between the projects. However, some interviewees who supported the current nine-point scale methodology were concerned whether the current differences between scales (maximum 17 times)

were appropriate or not. With respect to the weighting methodology, some interviewees wanted to adopt the same weighting within the same project type in order to create a balance between the need to reduce the exaggerated discretionary power of policy analysts and the need to reflect the difference characteristics of each project.

> *I think that Type 2 might be the best alternative to current PRP methodology. In terms of scale methodology, as the current nine-point scale methodology can increase the possibility of distinguishing among the projects, current scale methodology might be appropriate. As for the weighting methodology, as there are differences among the project characteristics according to the project types, the policy alternative where different weights are set for each project type with the same weighting set within each type might be appropriate (MOSF official, 2nd interview, Dec 2013).*

Reasons for adopting Type 3

According to the second interview results, there are two reasons for adopting Type 3 methodology. Firstly, as the B/C ratio can be unstable if there are changes in the hypothesis on which it is based, and the B/C ratio cannot be estimated exactly, due to technical limitations, the difference between the scales needs be reflected in the scale methodology, in order to increase the appropriateness of PRP. As for weighting methodology, 'the same weighting within the same project type' enables policy analysts to reflect their subjective judgment on the project whilst reducing their exaggerated discretionary power.

However, some interviewees raised the issue that classifying the types of projects might be a very controversial issue when adopting this alternative.

> *I consider Type 3 as an appropriate alternative to current PRP methodology. However, classifying the types of projects and the appropriate difference in weighting between the types might not be easy, because these decisions can strongly affect PRP results, while it is difficult to find objective reasons and evidence for them (Professor, 2nd interview, Dec 2013).*

Reasons for supporting current methodology

According to the interview results, four interviewees (two KDI analysts and two experts) insisted they would keep current PRP methodology. The reasons for this are similar to those presented above.

> *I think that Types 2, 4, and 5 have limitations when it comes to reflecting the different projects' characteristics. Types 3 and 1 are also inappropriate, because the balanced scale cannot reflect the differences between the projects which were gathered around B/C =1. In order to increase the possibility of distinguishing between similar projects and reflecting subjective judgments about the projects in the PRP results, the current methodology should be kept (Expert, 2nd interview, Nov 2013)*

6.4. Conclusion

This chapter has analyzed the appropriateness of using current PRP methodology through exploring the opinions of stakeholders who had taken part in the PRP process using the current PRP methodology.

Before the main question was taken up, the effect of the current PRP methodology on RBS decisions needed to be subjected to a preliminary analysis. In the last section, possible policy alternatives were compared with each other in terms of their effect on RBS decisions, and the opinions of stakeholders on the possible policy alternatives were explored.

As concerns the effect of current PRP methodology on RBS decision, we found that this played an important role in RBS decisions.

As concerns the impact of the nine-point scale methodology on RBS decisions, four and seven per cent of RBS decisions on the projects looked at were changed by changing the nine-point scale into a balanced scale. Furthermore, we also found that there was asymmetry between the number of projects for which RBS decisions were changed from ‘recommended’ into ‘not-recommended’ and the number of projects for which decisions were changed in the opposite direction. According to the results, all the projects for which RBS decisions were changed had the decision changed from ‘not-recommended’ to ‘recommended’ when the scale methodology was changed from a nine-point scale to a balanced scale methodology.

As concerns the impact of the current weighting methodology on RBS decisions, about 10 per cent of projects' RBS decisions (AHP≥0.5 or not) were changed by changing the current weighting methodology into a fixed weighting methodology. Furthermore, we found that there was asymmetry between the number of projects for which RBS decisions were changed from 'recommended' into 'not-recommended', and the number which changed in the opposite direction. In 16 out of 17 projects, the RBS decision was changed from 'recommended' to 'not-recommended' when the weighting set for the appraisal sub-factors was changed into one fixed weighting.

With respect to the appropriateness of using current PRP methodology, we found that there were different opinions about using the current PRP methodology among stakeholders who had taken part in the PRP process, according to their own interests and the project types which they appraised.

As concerns opinions on the current nine-point scale methodology, most policy analysts were not worried about this. However, the other stakeholders were, mostly, concerned about the current nine-point scale methodology. We also found that there were three main reasons for concern about the current nine-point scale: enlargement of the effect of some specific range of the B/C ratio; lack of precision in estimating the B/C ratio; and too great a difference between the scales. Secondly, the reasons for not being worried about the current nine-point scale could be divided roughly into two: the increase in the possibility of distinguishing between the B/C ratios of projects which gathered around B/C = 1; and the increase in the impact of the B/C ratio, which is produced objectively, on AHP scores.

As concerns opinions on the current weighting methodology, we found that most spenders opposed this and most policy analysts supported it. Also, most experts and MOSF officials supported the current methodology. We also discovered the main reasons for this. Firstly, the main reason for supporting the current weighting methodology was that policy analysts could reflect their own judgement of a project by manipulating the weighting set for appraisal sub-factors. Secondly, the main reason for opposing the weighting methodology was that the current methodology gave too much discretion to analysts. In particular, local government officials who were involved in other projects considered the lack of predictability for spenders of the PRP results to be the main problem of the current methodology.

Lastly, we analysed the effect of alternative methodologies in terms of their impact on RBS decisions. We found that each type of alternative methodology had a different effect on RBS decisions. An RBS decision might be decided by the joint effect of an alternative scale and weighting methodology. Firstly, the balanced scale methodology might better enable projects which have a relatively low B/C ratio to be successful in the PRP process than the nine-point scale does. Secondly, having the same weighting methodology might help prevent policy analysts from being too generous towards projects which have a higher score on policy factor than other projects. As for the favorite policy alternative of stakeholders, from the second interviews, we found that the stakeholders' favorite alternatives to PRP methodology were Type 3 (balanced scale methodology + same weight for projects according to their type), Type 1 (balanced scale methodology + different weight for each project), Type 2 (nine-point scale

methodology + same weight for projects according to their type) and current methodology, in that order.

The detailed meanings of these findings will be discussed in Chapter 8.

The next chapter will explore the existence of, the extent of, and the reasons for non-neutral behaviour by stakeholders in the PRP process. Also, it will suggest policy developments for improving the PRP system.

CHAPTER 7 NON-NEUTRAL BEHAVIOUR BY STAKEHOLDERS IN THE PRP

7.1. Introduction

This chapter explores the existence of, the extent of, and the reasons for non-neutral behaviour by stakeholders in the PRP. Also, it suggests policy developments for improving the PRP system. It employs multiple case studies from 16 projects which underwent PRP between 2006 and 2010 to explore how their RBS decisions could be changed by changing their weightings (setting the same weighting for each project). These projects were selected from the analysis for Research Question 2 (Chapter 6) and classified into two study areas: transportation, and other projects. In order to fully understand the non-neutral behaviour of stakeholders, the chapter analyses qualitative data from various documents and two rounds of in-depth interviews with Korean government officials and experts by using Nvivo 10, the qualitative data analysis software. The existence of non-neutral behaviour by stakeholders in PRP is explored on the basis of the theoretical framework developed in Chapter 4; and these non-neutral behaviours are categorized into four types, according to their intentionality and direction of tendency. Reasons for non-neutral behaviour are to be analyzed by multiple-tier and multiple-principal multiple-agent models which can be applied to the Korean PRP system.

7.2. Non-neutral behaviours of each stakeholder in the PRP

As seen in Chapter 4, the non-neutral behaviours of stakeholders who took part in the PRP can be categorised into four types according their intentionality and the direction of their tendency (See Table 7-1).

Table 7-1: Non-neutral behaviour according to intentionality and tendency

		Tendency	
		Over-stating AHP score	**Under-stating AHP score**
Intentionality	**Intended**	**Promoter (Type 1)**	**Blocker (Type 2)**
	Un intended	**Dr Pangloss (Type 3)**	**Cassandra (Type 4)**

7.2.1. Non-neutral behaviours of MOSF officials

If we consider previous research, we may suppose that MOSF officials have a natural tendency to regard PRP as a naïve, impractical tool whereby spenders can justify whatever it is they want to do (Boardman, Greenberg et al. 2010). We may also suppose that MOSF officials want to get accepted those projects which could help the President carry out his presidential program (Wildavsky and Caiden 1988). From the literature reviews, it seems that MOSF officials have two kinds of non-neutral behaviour when they take part in the PRP: ① they regard the PRP as naïve; and ② they are affected by their role in supporting their president. Consequently MOSF officials may ask policy analysts to amend the PRP (five out of six MOSF officials stated that they had experience of asking for amendments to the PRP results in the PRP process); or they may not give BS for some new projects which have been appraised as 'recommended'

in order to correct the naïve approach of policy analysts on the projects or to reflect their desire to favour presidential projects.

1) Regarding the PRP as naïve

Cassandra (Type 4: Unintended non-neutral behaviour with under-stating of AHP score)

According to the first interview results, MOSF officials regarded the PRP process as naïve when they took part in it. This non-neutral behaviour can be classified as the Cassandra type (Type 4 in Table 7-1), because, it can be characterized as unintended non-neutral behaviour with under-stating of the AHP score. Table 7-2 shows the results of interviews about the trust MOSF officials place in PRP results. According to the interviews, four out of six MOSF officials did not trust PRP results and they considered these results were produced by the naïve view of policy analysts on the projects. In particular, these MOSF official did not trust the PRP results of projects of which the B/C ratio was in the critical range (e.g. 0.8<B/C<1.0). Although two out of six MOSF officials trusted the PRP results, one of these mentioned that they had no choice but to rely on the results, saying:

> *Although there are doubts about the PRP results, I have no choice but to trust these results, because there is no other indicator for budgeting on large scale projects, and the MOSF has to be involved in the PRP process. (MOSF official, interviewed 26th Nov 2012)*

Table 7-2: Trust of MOSF officials in PRP results

(Unit: number of persons)

	Trust PRP results	Do not trust PRP results
Budget office official	1	2
Public finance bureau official	1	2
Total	2	4

These results indicated that MOSF officials were likely to consider the PRP results as naïve. When it comes to categorizing this non-neutral behaviour, it can be considered as the Cassandra type (Type 4 in Table 7-1), which is defined as unintended non-neutral behaviour with under-stating of the AHP score. Firstly, this non-neutral behaviour can be defined as unintended, because the MOSF officials who displayed it were not aware of their tendency (MacCoun 1998). Furthermore this non-neutral behaviour can be defined as under-stating of the AHP score, because the MOSF officials who displayed it were likely to be under-stating the AHP score in order to correct RBS results they believed to be the result of naïve appraisal.

I sometimes do not trust the results of PRP. In particular, it is difficult for me to accept the validity of the results of PRP on projects which have been appraised as feasible even though their B/C ratios are under 1.0. When I have given budget approval on new projects, sometimes, I have been reluctant to approve the budget of these kinds of project, because I have been concerned about what the real RBS of these projects is…. (MOSF official, interviewed 27th Nov 2012)

As a result of my individual experience, I have asked the KDI to devise a new approach for increasing the credibility of demand estimation, because I think the validity of the current method for estimating the demand of projects is low. …. (MOSF official, interviewed 28th Nov 2012)

2) Affected by political pressure

Promoter (Type 1: Intended non-neutral behaviour with over-stating the AHP score)

According to the first interview results, MOSF officials have been affected by political pressure when taking part in the PRP. This non-neutral behaviour can be considered as the Promoter type (Type 4 in Table 7-1), because, it can be characterized as intended non-neutral behaviour with over-stating the AHP score. Two out of six MOSF officials had asked analysts to reconsider their RBS results in order to accept projects which were essential for accomplishing the President's targets. One of the MOSF officials who had experience of asking for PRP results to be reconsidered said:

> *…. From time to time, MOSF asks the KDI to reconsider PRP results when they are worried about projects which are necessary to achieve government targets but which are likely to be appraised as non-feasible. (MOSF official, interviewed 26th Nov 2012)*

When it comes to categorizing this non-neutral behaviour, it can be considered as the Promoter type (Type 4 in Table 7-1), which is defined as intended non-neutral behaviour with over–estimating of the AHP score. Firstly, this non-neutral behaviour can be defined as intended, because MOSF officials who have this non-neutral behaviour are aware of their tendency (MacCoun 1998). Furthermore this non-neutral behaviour can be defined as over-stating the AHP score, because MOSF officials who display this non-neutral behaviour are likely to have a tendency in favor of over-stating the AHP score in order to accept projects which will help to achieve the President's targets.

7.2.2. Non-neutral behaviours of policy analysts

7.2.2.1. Non-neutral behaviours of KDI analysts

1) Objective technician (neutral behaviour)

Objective technician analysts consider analytical integrity as the basis of policy analysis (Weimer and Vining 2005). They bring to consultations with their clients a rigorous knowledge and analytic methodology. In this model, trade-offs among competing values should be left to the client and not made by the analyst.

All interviewees (14 policy analysts) who gave answers about the advocacy of KDI analysts stated that objective analysis was the important goal of KDI analysts in the PRP process and they tried to keep this goal in mind. From this result, it may be supposed that KDI analysts consider analytical integrity to be the basis of policy analysis and they are unlikely to have an intended tendency towards over-stating or under-estimating.

2) Hot bias

Dr Pangloss (Type 3: Unintended non-neutral behaviour with a tendency towards over-stating the AHP score); **Cassandra** (Type 4: Unintended non-neutral behaviour with a tendency towards under-stating the AHP score.)

According to previous research on unintended tendency by policy analysts in the appraisal process, unintended but directionally motivated tendency can be called ‘hot

bias[43]' (MacCoun 1998). Furthermore, there may be what psychologists call an optimism tendency (Flyvbjerg 2009), which can account for costs overrunning and/or a benefit shortfall. However, previous research had not mentioned the direction of hot bias, or it had mentioned only one direction (over-stating tendency). From the interview results, we found that there were two kinds of hot bias: the Dr Pangloss type (Type 3: unintended non-neutral behaviour with a tendency towards over-stating the AHP score) and the Cassandra type (Type 4: unintended non-neutral behaviour with a tendency towards under-stating the AHP score).

Table 7-3 shows the opinion of each policy analyst on the tendency of KDI analysts in the PRP process. Firstly, KDI analysts might have unintended non-neutral behaviour with a tendency towards under-stating or over-estimating, or a cold bias, in that order. As seen from Table 7-3, eight out of 15 references to the tendency of KDI analysts in the PRP process indicated that KDI analysts had a tendency towards under-stating the AHP score in the PRP process, and four out of 15 references stated that KDI analysts had a tendency towards over-stating the AHP score in the PRP process. By contrast with analysts who have a hot bias, and who have tendencies in particular directions, such as over-stating or under-estimating, policy analysts who have a cold bias are uncertain how to appraise projects, and so they put the score in the middle of the scale. For these reasons, it can be supposed that cold bias does not tend in any one direction in the PRP process. One KDI analyst described cold bias, saying:

> *In some case, policy analysts who have no experience of appraisal for PRP are likely to put their score on the middle of the scale. As professors and private*

[43] On the other hand, cold bias is unintentional, unmotivated biased evidence processing (MacCoun, 1998)

company analysts have expertise in the appraisal of projects, they are not likely to have a cold bias...(KDI analyst, interviewed 4th Dec 2012)

Secondly, policy analysts who had taken part in transportation projects stated that the most frequent tendency among KDI analysts was towards under-estimating. However, policy analysts who had taken part in other projects stated that over-stating and under-stating tendencies were equally likely among KDI analysts.

Thirdly, KDI analysts who had taken part in PRP on transportation projects stated that they had only an under-stating tendency, but this contrasted with other stakeholders' opinions about KDI analysts' tendency.

Table 7-3: Tendency of KDI analysts in the PRP process

(Unit: number of codings)

		Tendency			
		Hot bias		Cold bias	Total
		Over-estimating	Under-estimating	Unclear	
Transportation					
Policy analysts	***KDI analysts***	***0***	***3***	***0***	***3***
	Professors	0	0	1	1
	Private company analysts	1	2	0	3
	Sub-total	1	5	1	7
Others					
Policy analysts	***KDI analysts***	***2***	***2***	***1***	***5***
	Professors	0	0	0	0
	Private company analysts	1	1	1	3
	Sub-total	3	3	2	8
Total		4	8	3	15

When it comes to categorizing this non-neutral behaviour, it can be considered as the Dr Pangloss type (Type 3: unintended tendency towards over-stating the AHP score) or the Cassandra type (Type 4*:* unintended tendency towards under-stating the AHP score). This non-neutral behaviour can be defined as unintended, because KDI analysts who

had this non-neutral behaviour were not aware of their tendency (MacCoun 1998). Furthermore KDI analysts who had this non-neutral behaviour were likely to have not only a tendency towards over-stating the AHP score but also towards under-stating it.

7.2.2.2. Non-neutral behaviours of professors

1) Issue advocacy

Promoter (Type 1: Intended non-neutral behaviour with a tendency towards over-stating the AHP score); **Blocker** (Type 2: Intended non-neutral behaviour with a tendency towards over-stating the AHP score)

Weimer and Vining (2005) argue that issue advocacy analysts consider analytic mythology as the technique which enables them to accomplish their policy advocacy. If the result of the analysis is different from the value they have arrived at, they change the methodology or use other data to dispute the result. However, they did not mention a specific direction in which this behaviour tended. So, in this study, we tried to divide this behaviour into two, according to the direction it took: the Promoter type (Type 1: intended non-neutral behaviour with a tendency towards over-stating the AHP score); and the Blocker type (Type 2: intended non-neutral behaviour with a tendency towards over-stating the AHP score). The interview results suggested two implications of the issue advocacy of professors.

Table 7-4 shows the opinion of each policy analyst on the advocacy of professors in the PRP process.

Firstly, professors have to advocate the policy which satisfies their values (issue advocacy). They support their favorite policies and oppose projects that do not accord with their values, having both over-stating and under-stating tendencies, according to the character of the project. As seen in Table 7-4, 18 out of 27 references by policy analysts to the advocacy of professors stated that professors supported or opposed the launch of projects according to their view of their value. So, it may be supposed that most professors advocate their own values. On the other hand, two interviewees stated that professors supported the approval of projects which were promoted by their clients. There were only seven references to the fact that objective analysis was an important goal for professors. When it came to their tendency in advocacy, ten out of 18 references in interviews to issue advocacy as 'professors' advocacy' were about a tendency towards over-estimating; and the other four which referred to issue advocacy as 'professors' advocacy' were about a tendency towards under-estimating. Also, eight references to client advocacy as 'professors' advocacy' were about an over-stating tendency. Two interviewees discussed the various kinds of professors' advocacy, saying:

> *As for professors' advocacy, professors can be classified into three categories. Firstly, some professors consider making an objective analysis as important and others consider their clients' interests as important. Lastly, some professors consider expressing their own values in their opinion on a project as the most important thing. The tendencies of professors who consider their own values to be important can be divided into two: for and against the approval of projects. For example, professors who think the railway system is under-developed are likely to be for the launch of a*

railway project. On the other hand, professors who think that the railway system has been developed to a suitable level are likely to oppose new railway projects...(Professor, interviewed 30th Nov 2012)

Some professors are affected by their views on the necessity of projects. For example, a professor who thinks that agriculture is important for society may be on the side of agricultural projects and may try to ensure the success of such projects in the PRP process…(Private company analyst, interviewed 7th Dec 2012)

Secondly, when it comes to categorizing this non-neutral behaviour, it can be considered as the Promoter type (Type 1) or the Blocker type (Type 2).

Table 7-4: Advocacy of professors in the PRP process

(Unit: number of codings)

		Issue advocacy		Client advocacy	Objective technician	Total
Tendency		Over-stating	Under-stating	Over-stating	Neutral	
Transportation						
Policy analysts	KDI analysts	3	1	0	2	6
	Professors	***2***	***2***	***1***	***1***	***6***
	Private company analysts	1	1	0	1	3
	Total	6	4	1	4	15
Others						
Policy analysts	KDI analysts	1	1	1	1	4
	Professors	***1***	***1***	***0***	***2***	***4***
	Private company analysts	2	2	0	0	4
	Total	4	4	1	3	12
Total		10	8	2	7	27

2) Hot bias

Dr Pangloss (Type 3: unintended non-neutral behaviour with a tendency towards over-stating the AHP score); **Cassandra** (Type 4: unintended non-neutral behaviour with a tendency towards under-stating the AHP score.)

Table 7-5 shows the opinion of each policy analyst on the tendency of professors in the PRP. From the interviews, we found that professors had a tendency towards over-estimating, a tendency towards under-estimating, and a cold bias, in that order. As seen in Table 7-5, 12 out of the 25 references to the tendency of professors in the PRP process suggested that professors had an equal tendency towards over-stating and under-estimating. Two KDI analysts discussed the unintended tendency of professors, saying:

Some professors who believe that the total cost of a railway has been under-estimated at the project planning stage tend to consider that the estimated B/C ratio may be lower than the real B/C ratio. Thus they are likely to estimate RBS as a whole in the context of this belief…. (KDI analyst, interviewed 3rd Dec 2012)

Some professors have preconceptions about the RBS of projects before starting the PRP process for certain projects. Their preconceptions are created by their experience and their beliefs about the projects….(KDI analyst, interviewed 4th Dec 2012)

Table 7-5: Tendency of professors in the PRP process

(Unit: number of codings)

Tendency		Hot bias		Cold bias	Total
		Over-stating	Under-stating	Unclear	
Transportation					
Policy analysts	KDI analysts	3	3	0	6
	Professors	***2***	***2***	***0***	***4***
	Private company analysts	1	1	0	2
	Total	6	6	0	12
Others					
Policy analysts	KDI analysts	2	3	0	5
	Professors	***1***	***1***	***1***	***3***
	Private company analysts	3	2	0	5
	Total	6	6	1	13
Total		12	12	1	25

When it comes to categorizing this non-neutral behaviour, it can be considered as the Dr Pangloss type (Type 3: tendency towards over-stating the AHP score) or the Cassandra type (Type 4: tendency towards under-stating the AHP score). This non-neutral behaviour can be defined as unintended, because, professors who display it are not aware of their tendency (MacCoun 1998). Furthermore professors who have this non-neutral behaviour are likely not only to have a tendency towards over-stating the AHP score but also towards under-stating it, according to how a project relates to their values.

7.2.2.3. Non-neutral behaviours of private company analysts

1) Client advocacy

Promoter (Type 1: intended non-neutral behaviour with a tendency towards over-stating the AHP score)

Weimer and Vining (2005) argue that client advocacy analysts consider their responsibility for clients such as politicians and bureaucrats as the primary goal of analysis. The justification for this type of behaviour comes from the need to satisfy their clients. In this study, this type of non-neutral behaviour can be called the Promoter type (Type 1: intended non-neutral behaviour with a tendency towards over-stating the AHP score).

Table 7-6 shows the opinion of each policy analyst on the advocacy of private company analysts in the PRP process. From the first interview results, we found that private company analysts had this kind of non-neutral behaviour. As seen in Table 7-6, 14 out of 15 references by policy analysts to the advocacy of private company analysts stated that private company analysts supported the projects which were promoted by their clients, such as agents, local government and line-ministries. From this result, it may be supposed that private company analysts consider their clients' interests as important and they are likely to have a tendency towards over-stating the AHP score in projects they want to promote. Three interviewees who commented on the advocacy of private company analysts said:

Private company analysts consider their relationship with their clients who will launch the projects after the PRP process is over, because they want to take part in the construction of the projects. Thus, private company analysts want to pass the projects which are proposed by their clients…. (Professor, interviewed 1st Dec 2012)

Private company analysts who take part in the PRP process as experts on estimating the cost of projects have an incentive to promote the projects, because they want to take part in the projects when these are launched. …. (Professor, interviewed 12th Dec 2012)

Private company analysts want to expand the industries with which their company is related. Thus they want to pass those projects which are related to their area… (KDI analyst, interviewed 7th Dec 2012)

Table 7-6: Advocacy of private company analysts in the PRP process

(Unit: number of coding)

		Client advocacy	Objective technician	Total
Tendency		Over stating	Neutral	
Transportation				
Policy analysts	KDI analysts	3	0	3
	Professors	2	0	2
	Private company analysts	***2***	***0***	***2***
	Total	7	0	7
Others				
Policy analysts	KDI analysts	3	0	3
	Professors	1	1	2
	Private company analysts	***3***	***0***	***3***
	Total	7	1	8
Total		14	1	15

When it comes to categorizing this non-neutral behaviour, it can be considered as the Promoter type (Type 1: intended non-neutral behaviour with a tendency towards over-stating the AHP score), because this non-neutral behaviour is intended and private

company analysts who display it are likely to have a tendency towards over-stating the AHP score in order to secure a project which will promote their clients' interests.

2) Hot bias

Dr Pangloss (Type 3: unintended non-neutral behaviour with a tendency towards over-stating the AHP score)

Table 7-7 shows the opinion of each policy analyst on the tendency of private company analysts in the PRP process.

As for unintended non-neutral behaviour, private company analysts in the PRP process, according to the interviews, were found to have a tendency towards over-stating the AHP score and a cold bias. As seen from Table 7-7, eight references out of 14 to tendency in private company analysts in the PRP process indicated that private company analysts had a tendency towards over-estimating. Private company analysts have expertise in their own area of study in terms of cost. However, they do not have sufficient knowledge for whole RBS decisions, and so six references out of 14 to the tendency of private company analysts in the PRP process stated that private company analysts had a cold bias. Two interviewees who mentioned the over-stating tendency of private company analysts said:

> *As for private company analysts, they are likely to promote projects, even though these may be less than feasible. In the same vein, they are likely to interpret the information on projects according to the results they want, which they judge in advance…. (Private company analyst, interviewed 6th Dec 2012)*

Some private company analysts have an optimistic attitude towards projects' potential when they appraise these projects. I think they might be affected by their preconceptions about projects, and sometimes they are affected by the will of line-ministry officials who want to promote the projects…. (KDI analysts, interviewed 4th Dec 2012)

Table 7-7: Tendency of private company analysts in the PRP process

(Unit: number of codings)

		Hot bias		Cold bias	Total
Tendency		Over-stating	Under-stating	Unclear	
Transportation					
Policy analysts	KDI analysts	2	0	1	2
	Professors	1	0	2	3
	Private company analysts	***1***	***0***	***1***	***2***
	Total	4	0	4	8
Others					
Policy analysts	KDI analysts	2	0	1	3
	Professors	1	0	1	2
	Private company analysts	***1***	***0***	***0***	***1***
	Total	4	0	2	6
Total		8	0	6	14

When it comes to categorizing this non-neutral behaviour, it can be considered as the Dr Pangloss type (Type 3: tendency towards over-stating the AHP score), because this non-neutral behaviour is unintended and private company analysts who display it are likely to have a tendency towards over-stating the AHP score.

7.2.3. Non-neutral behaviours of spenders

According to Boardman, Greenberg et al. (2010), the views of spenders on public projects have several points in common:

① Spenders have a natural tendency to regard expenditure on constituents as benefits rather than as costs: constituency-support analysis.

② Spenders tend to favor large, irreversible, capital-intensive projects.

③ Spenders tend to support any alternative rather than the status quo (no project).

On the other hand, Flyvbjerg (2009) argues that spenders are likely to show their projects at their best at the PRP stage in order to get budgets for them. He shows that strong interests and strong incentives exist at the project approval stage to present projects as favorably as possible – that is, with the benefits emphasized and the costs and risks down-played. Considering this previous research, two hypotheses can be posited for the non-neutral behaviour of spenders:

①Spenders show their projects at their best at the PRP stage

As large-scale projects are constructed using the national budget and there are doubts about the boundary between the benefits and costs range of B/C, it may be supposed that spenders want to show their projects at their best at the PRP stage.

②Constituency-support analysis

As spenders have a natural tendency to regard expenditure on constituents as a benefit rather than as a cost, it may be supposed that spenders support the

promotion of projects which are located in their area or promoted by their agency or department, even though their costs exceed their benefits.

1) Spenders show their projects at their best at the PRP stage

Promoter (Type 1: intended non-neutral behaviour with a tendency towards over-stating the AHP score)

According to previous research (Flyvbjerg 2009), it may be supposed that spenders are likely to show their projects at their best at the PRP stage in order to get a budget for them by over-stating their AHP scores. Furthermore, considering the nine-point scale, which exaggerates the impact of the B/C ratio on RBS decisions and information asymmetry among spenders and other stakeholders, it is likely that spenders try to get a B/C ratio that is better than other sub-appraisal factors through giving only selected information to other stakeholders.

Table 7-8 shows the opinion of each spender on their strategic behaviour and target appraisal factors in the PRP process. In the interviews, we found that spenders were likely to display strategic behaviour and present their information on projects selectively in order to promote their favorites. As seen in Table 7-8, only one spender stated that they might not behave strategically in the PRP process. When it came to the target sub-appraisal factors, which they considered important in their strategic behaviour, ten out of 13 references indicated that spenders considered the B/C ratio as an important factor when they behaved strategically in the PRP process.

In order to show the feasibility of my projects in the PRP process, I try to reduce their costs and expand their benefits through the emphasis I give to their effects…. (Line-ministry official, interviewed 26th Nov 2012)

Table 7-8: Strategic behaviour of spenders and their target appraisal factors

(Unit: number of codings and persons)

	Display strategic behaviour			Do not display strategic behaviour	Total
	Over-stating AHP score				
	B/C target	Policy factor target	Regional factor target		
Transportation					
Agency	1	1	0	1	3
Line-ministry	3	0	0	0	3
Sub-total	4	1	0	1	6
Others					
Local government officials	3	1	1	0	5
Line-ministry	3	0	0	0	3
Sub-total	6	1	1	0	8
Total	10	2	1	1	14

On the other hand, Table 7-9 shows whether spenders are presenting their information on projects to other stakeholders fully or selectively. Eight out of 12 spenders stated that they presented their information on projects to other stakeholders selectively in order to get a better B/C ratio. From this table, it may be supposed that spenders can display strategic behaviour in over-stating the AHP score of their own projects through presenting information selectively to policy analysts.

> *If I am asked for certain information by policy analysts, I give them the information according to the request form. However, when information is not asked for, if it may be expected to increase the possibility of a feasible decision, I present it; if not, I do not present it…. (Line-ministry official, interviewed 27th Nov 2012)*

Table 7-9: Behaviour of spenders when they present their information to other stakeholders

(Unit: number of persons)

	Present information selectively	Present information fully
Local government officials	1	2
Agency	2	1
Line-ministry	5	1
Total	8	4

When it comes to categorizing this non-neutral behaviour, it may be considered as the Promoter type (Type 1: intended non-neutral behaviour with a tendency towards over-stating the AHP score), because this non-neutral behaviour is intended, and spenders who display such behaviour are likely to have a tendency towards over-stating the AHP score in order to secure their project.

2) Constituency-support analysis

Dr Pangloss (Type 3: unintended non-neutral behaviour with a tendency towards over-stating the AHP score)

According to previous research, spenders have a natural tendency to regard expenditure on constituents as a benefit rather than a cost. An exploration of this kind of non-neutral behaviour can be called a constituency-support analysis. Spenders who display this behaviour might promote projects which are located in their area or being pushed by their agency or department, even though their costs exceed their benefits.

In the interviews, we found that spenders support and promote their constituency projects, even when the costs of these exceed the benefits. As seen in Table 7-10, nine out of 11 spenders stated that they would support their projects even though the costs exceeded the benefits. Only two spenders did not want to support projects on that basis.

When it comes to the reason for supporting inefficient projects, local government officials stated that, if a project benefited their region, it should be promoted. On the other hand, a line-ministry interviewee and an agency interviewee stated that, as there were arguments among stakeholders on the criteria for deciding benefits and costs, it would have been better to support certain projects for which the B/C ratio was under-estimated, in their view. One line-ministry official who wanted to promote an inefficient project said:

> *As for me, I think that some projects are under-estimated in terms of their B/C ratio because of irrational and out-of-date criteria of benefit and cost. For this reason, in some cases, projects should be launched even though they are appraised as inefficient…. (Line-ministry official, interviewed 26th.Nov 2012)*

Table 7-10: Opinions of spenders about the promotion of projects for which the costs exceed the benefits

(Unit: number of persons)

	Pro	Anti	Total
Transportation			
Agency	3	0	3
Line-ministry	2	1	4
Sub-total	5	1	6
Others			
Local government officials	2	1	3
Line-ministry	2	0	4
Sub-total	4	1	5
Total	***9***	***2***	***11***

This non-neutral behaviour can be categorized as the Dr Pangloss type (Type 3: a tendency towards over-stating the AHP score). It is unintended, because those displaying it naturally regard expenditure on constituents as a benefit rather than a cost. Furthermore spenders who display this non-neutral behaviour are likely to have a tendency towards over-stating the AHP score.

7.2.4. Summary of findings

Table 7-11 shows the result of combining literature review results and interview results for non-neutral behaviour in the PRP process. Drawing on the interview results, we found that non-neutral behaviour by stakeholders in the PRP process could be divided into four types according to their intentionality and the direction of their tendency, as follows.

Type 1: Promoter

Promoter (Type1) behaviour can be characterized as intended non-neutral behaviour with a tendency towards over-stating the AHP score of projects. In this model, stakeholders are likely to use and emphasize evidence selectively in order to promote projects (MacCoun 1998). Drawing on interviews, we found that most private company analysts who had client advocacy, and some professors who wanted to promote their favorite project because of their own values, might fall into this category of non-neutral behaviour. However, most spenders who wanted to show their projects at their best at

the PRP stage, and some MOSF officials who wanted to promote projects which were supported by the President, might also fall into this category.

Type 2: Blocker

Blocker (Type 2) behaviour can be characterized as intended non-neutral behaviour with a tendency towards under-stating the AHP score of a project. In this model, stakeholders were likely to use and emphasize evidence selectively to prevent projects being promoted (MacCoun 1998). Drawing on interviews, we found that some professors who wanted to prevent projects they disapproved of as a result of their own values might fall into this category of non-neutral behaviour.

Type 3: Dr Pangloss

Dr Pangloss (Type 3) behaviour can be characterized as unintended non-neutral behaviour with a tendency towards over-stating the AHP score of projects. In this model, as optimism tendency is a tendency that causes a person to believe that they are less at risk of experiencing a negative effect than others (Shepperd, Carroll et al. 2002), stakeholders are likely to under-estimate costs and over-estimate benefits (Flyvbjerg 2009). The behaviour of many of private company analysts and professors who have a hot bias towards over-stating the AHP score of projects might fall into this category of non-neutral behaviour. The behaviour of some spenders who have a constituency-support analysis view is likely to include this type of non-neutral behaviour as well.

Type 4: Cassandra

Cassandra (Type 4) behaviour can be characterized as unintended non-neutral behaviour with a tendency towards under-stating the AHP score of projects. In this model, as

pessimism tendency causes people to exaggerate the likelihood that negative things will happen to them, stakeholders are likely to over-estimate costs and under-estimate benefits (Sutton 1999). The behaviour of many of KDI analyst and professors who have a tendency towards under-stating the AHP score of projects might fall into the category of non-neutral behaviour. Furthermore, most MOSF officials who distrust PRP result and ask for the PRP score to be amended might also be categorized as exhibiting Type 4 non-neutral behaviour.

Table 7-11: Non-neutral behaviour according to intention and tendency

		Tendency	
		Over-stating AHP score	**Under–estimating AHP score**
Intentionality	**Intended**	**Promoter (Type 1)**	**Blocker (Type 2)**
		▪ **Client advocacy** - *Private company analysts (14 out of 15 references)* - *Professors (2 out of 27 references)* ▪ **Issue advocacy** - *Professors (10 out of 27 references)* ▪ **Showing their projects at their best at the PRP stage** - *Spenders (11 out of 12 references)* ▪ **Affected by political pressure** - *MOSF (2 out of 6 MOSF officials)*	▪ **Issue advocacy** - *Professors (8 out of 27 references)*
	Un intended	**Dr Pangloss (Type 3)**	**Cassandra (Type 4)**
		▪ **Hot bias** - *KDI analysts (4 out of 15 references)* - *Professors (12 out of 25 references)* - *Private company analysts (8 out of 14 references)* ▪ **Constituency-support analysis** - *Spenders (9 out of 11 spenders)*	▪ **Hot bias** - *KDI analysts (8 out of 15 references)* - *Professors (12 out of 25 references)* ▪ **Regard PRP as naïve** - *MOSF (4 out of 6 MOSF officials)*

7.3. Reasons for non-neutral behaviour by each stakeholder in the PRP process

According to the results of analysis for Research Question 3, policy analysts display diverse advocacies and bias when they take part in the PRP process. Although the judgment of each stakeholder is affected by their goal (Meltsner 1976, Weimer and Vining 2005), their value chain and the information they have, if the judgment of each stakeholder is too subjective, or even opportunistic, it may undermine trust in appraisal and cause inefficiency in budget allocation that is related to the PRP process. This is why the reasons for each policy analyst's non-neutral behaviour should be explored, in order to exert proper control over the non-neutral behaviour of each stakeholder. In this study, each stakeholder's role in the PRP, and the relationships among all the stakeholders in PRP, can be defined as multiple-tier and multiple-principal multiple-agent (Dixit 2002). Furthermore, the reasons for each policy analyst's non-neutral behaviour can be explored through the relationships between individual stakeholders, which are divided up according to their goal conflict and information levels (Waterman and Meier 1998).

7.3.1. Goals and information which each stakeholder has

7.3.1.1. Goals which each stakeholder has

Stakeholders apply their preferences when choosing among alternatives according to rational choice theory (Bertelli 2012); and the behaviour of stakeholders in getting budgets for large-scale projects can be determined by the amount and kinds of

transcendental information, the objective of these, and the psychological factor (Meltsner 1976, Wildavsky and Caiden 1988, Weimer and Vining 2005). The real behaviour of each stakeholder can be identified through the exploration of the stakeholders' goals which have rarely consensuses in public sector (Bovaird and Löffler 2009). According to the interviews, the goals of each stakeholder are as follows.

Firstly, the most important goal of spenders might be to promote projects through PSF. Spenders are usually in service or line departments. The goals of spenders are somewhat more varied that those of other MOSF officials because the constituencies of particular agents are more varied. Normally, spenders focus on providing projects or services to particular groups in society (Boardman, Greenberg et al. 2010). Local government stands to benefit from a project which will be located in their area (Flyvbjerg 2009), whereas some line-ministry officials are prone to cognitive dissonance because they have dual allegiances, and are likely to be unsure whether they are guardians, spenders, or both (Boardman, Greenberg et al. 2010). In the interviews, we found that the general target of spenders was to promote their projects. As seen in Table 7-12, 12 out of 17 references to this question cited promotion of their projects as the most important objective of spenders.

On the other hand, there was a big difference between the opinions of interviewees who had taken part in PSF for transportation projects and those involved with other projects. Although promoting their projects might be the only goal of spenders who took part in PRP on other projects, promoting their projects was likely to be the most important goal, but not the only goal, of spenders who took part in PRP on transportation projects.

Table 7-12: Goals of spenders

(Unit: number of coding)

		National-level benefit	Line-ministry budget efficiency	Promotion of project	Total
Transportation projects					
Spender	Agency worker	1	1	3	5
	Line-ministry	2	1	3	6
	Sub-total	3	2	6	11
Other projects					
Spender	Local government	0	0	3	3
	Line-ministry	0	0	3	3
	Sub-total	0	0	6	6
Total		***3***	***2***	***12***	***17***

Secondly, policy analysts have diverse goals (Meltsner 1976) according to each type of policy analyst. According to previous research, the goals of policy analysts can be divided into three: displaying analytical integrity; promoting their clients' interests; and promoting analysts' values (Weimer and Vining 2005). In the interviews, we found that policy analysts might have different goals from each other. KDI analysts consider analytical integrity as an important goal when they take part in the PRP process. On the other hand, professors consider promoting their values as an important goal when they take part in the PRP process. Lastly, private company analysts consider their clients' interests as an important goal when they take part in the PRP process (see Table 7-13).

Table 7-13: Goals of each type of policy analyst

(Unit: number of codings)

	Analytical integrity	Clients' interests	Their own values	Total
Transportation projects				
KDI analysts	**6**	0	0	6
Professors	4	1	**10**	15
Private company analysts	0	**7**	0	7
Sub-total	10	8	10	28
Other projects				
KDI analysts	12	0		12
Professors	3	1	8	12
Private company analysts	1	7		8
Sub-total	16	8	8	32
Total	26	16	18	60

Lastly, efficiency of budget allocation and minimization of expenditure can be goals of MOSF officials in PRP process. People whose behaviour marks them out as 'guardians' are often found in central budgeting agencies and in financial control or accounting functions within line agencies. As guardians tend to have a bottom-line budgetary orientation (Boardman, Greenberg et al. 2010), they may seek to minimize net budgetary expenditure. And, as they also have an interest in realistic appraisals for decisions on funding for specific projects (Flyvbjerg 2009), they may also seek efficiency in budget allocation. From the interview results, we found that both efficiency of budget allocation and minimization of expenditure were considered as important goals by MOSF officials. Table 7-14 shows the interview results that present the goals of MOSF officials. Thirty out of 34 interviewees referred to one or both of these objectives, that is, to efficiency of budget allocation (16 out of 34) and the minimization of expenditure (14 out of 34), as being important to the MOSF. The other objectives of the MOSF mentioned by stakeholders were the achievement of

government tasks (three out of 34) and producing a rational response to political pressure (one out of 34). When it came to exploring each stakeholder's opinion on the objectives of the MOSF, there was a slight difference among the opinions of the spenders and that of the other stakeholders. Contrary to other stakeholders, who were of the opinion that the MOSF's objective was to concentrate on the efficiency of budget allocation and minimize expenditure (25 out of 28), MOSF officials placed relatively more stress on fulfilling government tasks (two out of six) than did other stakeholders (1 out of 28). From these results, it maybe supposed that although the objectives of the MOSF may be simply efficiency of budget allocation and minimization of expenditure (Boardman, Greenberg et al. 2010), MOSF officials consider their objectives to be more diverse than other stakeholders do.

Table 7-14: Goals of the MOSF

(Unit: number of codings)

	Efficiency of budget allocation	Minimization of expenditure	Gov't task, political pressure	Total
Spenders	6	3	2	11
Policy analysts	8	9	0	17
MOSF	2	2	2	6
Total	16	14	4	34

From the interview results, we found that the objectives of each stakeholder might be different from those of the others. This suggests that stakeholders are not value neutral, but bring to the PRP process their own value systems (Meltsner 1976). Table 7-15 shows the goals of each stakeholder which were explored from the interview.

Table 7-15: Goals of each stakeholder in the PRP process

(Unit: number of codings)

		GOALS
SPENDERS		Promote project *(12 out of 17 references)* National-level benefit *(3 out of 17)* Line-ministry budget efficiency *(2 out of 17)*
POLICY ANALYSTS	KDI analysts	Analytical integrity *(18 out of 18)*
	Professors	Their values *(18 out of 27)* Analytical integrity *(7 out of 27)* Clients' interests *(2 out of 27)*
	Private company analysts	Clients' interests *(14 out of 15)* Analytical integrity *(1 out of 27)*
MOSF		Efficiency of budget allocation *(16 out of 34)* Minimize expenditure *(14 out of 34)* Gov't task, political pressure *(4 out of 34)*

7.3.1.2. Information which stakeholders have

Knowing the information level of each stakeholder can be important for exploring the reasons for non-neutral behaviours, because the behaviour of principal and agent can be different according to the information level which they have, even though they have the same goals or different goals from each other (Waterman and Meier 1998, Bertelli 2012).

From the interviews, we found that each stakeholder had a different level of information and expertise from the others. For example, spenders and policy analysts might have similar information on a projects itself and similar engineering expertise, which might

be more than that of MOSF officials. We also found that there was an asymmetry of information among stakeholders. According to the interviews, 29 interviewees out of 30 stated that there were information asymmetries among the stakeholders. From these results, it can be supposed that the relationship among stakeholders who took part in the PRP process may be a principal-agent relation where each principal has insufficient technical knowledge of some part of the PRP process (Bertelli 2012).

One policy analyst who thought that information asymmetries occurred reciprocally among stakeholders said:

> *There are different information asymmetries according to types of information and expertise. For example, as concerns the project itself and engineering information, spenders have more information than policy analyst, who have more information than the MOSF. On the other hand, as concerns appraisal tools, policy analysts have more information than the other two stakeholders. (Policy analyst, interviewed 1st Dec 2012)*

7.3.1.3. Summary of findings

From the interview results, we realized that each stakeholder had diverse goals and different levels of information. Table 7-16 shows the result of interviews about the goals and information level that each stakeholder had. Spenders considered promoting their projects as their most important goal and they had a great deal of information about their projects. On the other hand, most MOSF officials considered efficiency of budget allocation as their most important goal, and some MOSF officials considered

political rationalization as their goal and had a low level of information on the projects. When it came to policy analysts, they had a medium (or high) level of information on the projects and each policy analyst had different goals from the other ones.

Table 7-16: Goals and information level of each stakeholder

		Goals	Information on projects
Spender		Promoting project	High level
Policy analysts	KDI analysts	Objective analysis	High level
	Professors	Objective analysis Interests of clients	High level
	Private company analysts	Interests of clients	High level
MOSF		Efficiency of budget allocation Political rationalization	Low level

7.3.2. Relationships among stakeholders in the PRP process

The non-neutral behaviours of stakeholders who take part in the PRP process can be explained by stakeholders' diverse and conflicting goals and the information asymmetry among stakeholders (Waterman and Meier 1998). Intended non-neutral behaviours which are related to the hidden actions of each stakeholder can be explored through extended principal-agent models, as suggested by Waterman. On the other hand, unintended non-neutral behaviours which are related to the hidden character of each stakeholder can be explored by an adverse selection model (Waterman and Meier 1998, Dixit 2002).

7.3.2.1. Applying an extended principal-agent model to the PRP process

The intended non-neutral behaviours of stakeholders can be explored through an extended principal-agent model which is set by Waterman and Meier (1998) and Dixit (2002). As seen from Figure 7-1, the relationships among stakeholders in the PRP might be defined as presenting a multiple-tier model, because policy analysts (KDI analysts, professors and private company analysts) are the principal for spenders and the agent for the MOSF. Furthermore, the middle tier (policy analysts) is composed of multiple actors such as KDI analysts, professors and private company analysts. Thus, the relationship between stakeholders in the PRP process might be defined as a multiple-principal multiple-agent model as well. Consequently, relationships between stakeholders might be defined as multi-tier and as multiple-principal multiple-agent. Furthermore, as seen in Table 7-16, considering the conflicting goals and different information levels which stakeholders have, the relationships among stakeholder in the PRP process can be divided into four types: advocacy coalitions, principal-agent, policy subsystems and bottom line types, according to the goals and information which they have.

Figure 7-1: Extended principal-agent model for the PRP process

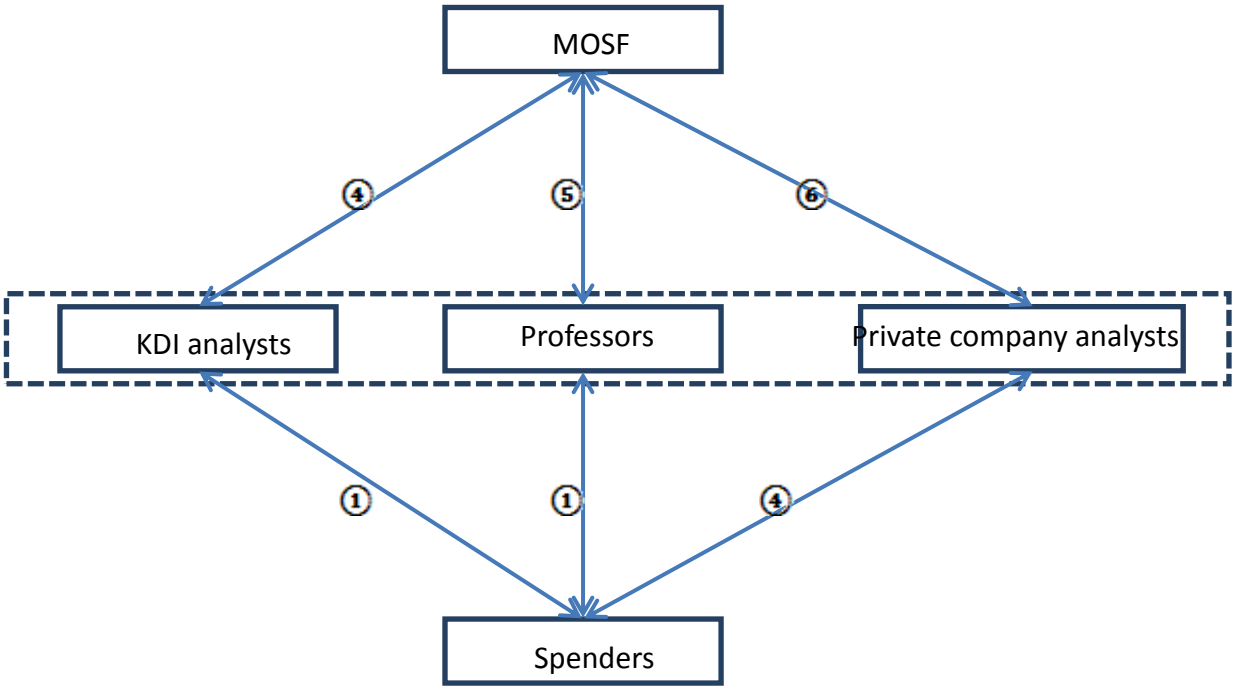


Table 7-17: Extended principal-agent model combining goals and information

Goal conflict		Agent's information level	
		Low	High
Principal's information level	High	Type 4: Patronage system	Type 3: Advocacy coalitions ①, ②
	Low	Type 1: Bumper sticker politics	Type 2: Principal-agent ⑤, ⑥

Goal consensus		Agent's information level	
		Low	High
Principal's information level	High	Type 8: Plato's Republic	Type 7: Policy subsystems ②, ③
	Low	Type 5: Theocracy	Type 6: Bottom line ④, ⑤

Source: Waterman and Meier (1998) and 1st interview results

Relationship between KDI analysts and spenders (①): *advocacy coalitions*

In this relationship, as spenders set up projects and present information to KDI analysts in order to support the KDI's implementation of PRP, KDI analysts may be seen as the principal and spenders as the agent. According to the interviews, it may be supposed that the goal of KDI analysts (objective analysis) and the goal of spenders (promotion of projects) are different from each other, and it may be also supposed that both KDI analysts (the principal) and spenders (the agent) have a high level of information. For these reasons, it may be supposed that the relationship between KDI analysts and spenders is of the advocacy coalition type as seen in the Waterman and Meier (1998) model.

Relationship between professors and spenders (②): *advocacy coalitions, policy subsystems*

In this relationship, as spenders set up projects and present information to professors in order to support the professors in their implementation of PRP, professors may be the principal and spenders may be the agent. According to the interviewees, as the goals of professors are diverse, and include objective analysis, their own values and their clients' interests, it may be supposed that the goals of professors and spenders are in some cases similar and in other cases different. On the other hand, according to the interviews, it may also be supposed that both professors (the principal) and spenders (the agent) have a high level of information. For these reasons, it may be supposed that the relationship between professors and spenders in some cases (goal consensus) belongs to the advocacy coalition type and in other cases (goal conflict) belongs to the *policy subsystems type* as seen in the Waterman and Meier (1998) model.

***Relationship between private company analysts and spenders (③)**: policy subsystems*

In this relationship, as spenders set up projects and present information to private company analysts in order to support private company analysts in their implementation of PRP, private company analysts may be the principal and spenders may be the agent. According to the interviews, it may be supposed that the goal of private company analysts (the interests of their clients) and the goal of spenders (promoting the projects) are similar to each other; and it may also be supposed that both private company analysts (the principal) and spenders (the agent) have a high level of information. For these reasons, it may be supposed that the relationship between private company analysts and spenders is of the *policy subsystems* type as seen in the Waterman and Meier (1998) model.

***Relationship between the MOSF and KDI analysts (④):** bottom line*

In this relationship, as KDI analysts take part in PRP in order to support MOSF officials' budget decisions, MOSF analysts may be the principal and KDI analysts may be the agent. According to the interviews, it may be supposed that the goal of the MOSF (efficiency of budget allocation) and the goal of the KDI (objective analysis) are similar to each other and it may be also supposed that the MOSF (the principal) has less information than the KDI analysts have. For these reason, it may be supposed that the relationship between the MOSF and KDI analysts is of the *bottom line* type as seen in the Waterman and Meier (1998) model.

Relationship between the MOSF and professors (⑤): *principal agent, bottom line*

In this relationship, as professors take part in PRP in order to support MOSF officials' budget decisions, MOSF analysts may be the principal and professors may be the agent. According to the interviews, although the goal of the MOSF is efficiency of budget allocation, the goals of professors are diverse and include objective analysis, their own values and clients' interests, so there may be both goal conflict and goal consensus between the two actors. Furthermore the MOSF (the principal) has less information than the professors. From these results it may be supposed that the relationship between the MOSF and KDI analysts is of the *principal-agent (goal conflict) type or the bottom line (goal consensus) type* as seen in the Waterman and Meier (1998) model.

Relationship between the MOSF and private company analysts (⑥): *principal agent*

In this relationship, as private company analysts take part in PRP in order to support MOSF officials' budget decisions, MOSF analysts may be the principal and private company analysts may be the agent. According to the interviews, it may be supposed that the goals of the MOSF (efficiency of budget allocation) and the goals of private company analysts (the interests of their clients) are different from each other and it may also be supposed that the MOSF (the principal) has less information than private company analysts have. For these reason, it may be supposed that the relationship between the MOSF and private company analysts is a principal-agent one as seen in theWaterman and Meier (1998) model.

7.3.2.2. Applying an adverse selection model to the PRP process: ④, ⑤, ⑥

The unintended tendency of policy analysts on projects can be divided into two types, hot bias and cold bias (MacCoun, 1998). Furthermore these can give rise to technical, psychological and political-economic explanations for inaccurate forecasts (Flyvbjerg, 2009). As technical explanations account for inaccurate forecasts in terms of impact forecasting techniques, inadequate data and lack of experience on the part of forecasters, this may be related to cold bias, which is unintentional and unconscious. Psychological explanations account for inaccurate forecasts in terms of what psychologist call planning fallacy and optimism tendency, and this may be related to hot bias, which is unintentional and perhaps unconscious, but is directionally motivated.

In this study, the reason for the unintended tendency of policy analysts can be explored through an adverse selection model, because this tendency is related to policy analysts' characteristics and the views, experience and expertise they bring to projects, and it is difficult for the principal (the MOSF) to know the characteristics of each policy analyst because of information asymmetry. As cold bias is unintentional, unconscious and occurs, even when the person making a judgment is earnestly striving for accuracy (MacCoun, 1998), analysts who do not have the expertise required for a project may have a cold bias.

On the other hand, as hot bias is unintentional and perhaps unconscious, but is directionally motivated (MacCoun, 1998), so each analyst may have a different tendency of hot bias, according to their goal. For this reason, it may be supposed that KDI analysts and some professors whose goal is objective analysis are likely to have an under-stating tendency; and it may also be supposed that spenders and some professors

whose priorities are their own values and their clients' interests are likely to have an over-stating tendency.

7.3.3. Reasons for the non-neutral behaviour of the different stakeholders

7.3.3.1. Reasons for MOSF officials' non-neutral behaviour

Drawing on the previous analysis, we found that MOSF officials had two kind of non-neutral behaviour: that which was affected by political pressure, and that which resulted from regarding PRP as naïve. Consequently, MOSF officials ask policy analysts to reconsider PRP results. Also, they select policy analysts who have a hot bias or a cold bias as policy analysts for the PRP process because of the information asymmetry relating to the characteristics of policy analysts.

① Reasons for regarding PRP as naïve and for being affected by political pressure

(Cassandra: unintended tendency towards under-stating the AHP score; Promoter: intended tendency towards over-stating the AHP score).

Bottom line relationship (Type 6)

According to the extended principal-agent model, it may be supposed that MOSF officials have two kind of relationship with each analyst, deriving from goal conflict and information asymmetry: a bottom line relationship; and a principal-agent relationship. Of these two relationships, the bottom line relationship should be explored in order to find the reasons for MOSF officials' non-neutral behaviour, because the

policy implications for principals can be taken from bottom line relationships (Waterman, 1998). According to the bottom line relationship, agents (policy analysts) are assigned a task with a clear goal and are then simply left alone as long as no major disasters occur. Only if some major problem occurs do the principals (MOSF officials) intervene and try to take corrective action. As a result of this relationship between MOSF officials and policy analysts, MOSF officials (principals) whose goal is efficiency in budget allocation may ask KDI analysts and some professors whose goals are the same as theirs to amend PRP results when they think a major problem has occurred in the PRP process, such as PRP results indicating a naïve attitude. On the other hand, MOSF officials (principals) whose goal is to fulfill government targets and achieve political rationalization may ask private company analysts and some professors whose goals are the same as theirs to amend PRP results when they think a major problem has occurred in the PRP process, such as the rejection of presidential projects.

②Reasons for selecting biased policy analysts

Adverse selection model

The adverse selection model is useful for exploring the hidden characteristics of agents (Dixit, 2002, Lee, 2008). The reason for selecting policy analysts who have a hot or a cold bias can be explored using the adverse selection model, because hot and cold bias are unintended and relate to policy analysts' views and expertise on the projects which they are appraising. Selection of these biased policy analysts by MOSF officials can be explained through the adverse selection model, because the adverse selection of principals can occur under two conditions: information asymmetry about agents'

characteristics; and agent's self-selection because of their interests (Dixit, 2002, Lee, 2008). In the PRP process, cold and hot bias are related to policy analysts' characteristics, such as their existing views, their experience, and their expertise in relation to the project, and it is difficult for the principals (MOSF officials) to know the characteristics of each policy analyst because of information asymmetry. For these reasons, MOSF officials may select biased policy analysts.

7.3.3.2. Reasons for policy analysts' non-neutral behaviour

1) Reasons for KDI analysts' non-neutral behaviour

(Dr Pangloss: unintended tendency towards over-stating the AHP score; Cassandra: unintended tendency towards under-stating the AHP score)

Drawing on the previous analysis, we found that KDI analysts had a hot bias towards over-stating the AHP score, a hot bias towards under-stating the AHP score, and a cold bias, in that order.

Adverse selection model

As regards hot bias, interview results suggested that experienced policy analysts were likely to have a hot bias which was related to their preconceptions, and they made less effort to appraise projects than inexperienced policy analysts. In view of this tendency, MOSF officials, who made the same payment for the work of all policy analysts, were

likely to give contracts to experienced policy analysts, who might have a hot bias and make less effort to appraise the projects.

According to the interviews, policy analysts who had plenty of experience in PRP had more of a hot bias and less of a cold bias than others. One KDI analyst said:

> *… From time to time, KDI policy analysts who have plenty of experience of PRP prejudge a project on the basis of their previous experience…On the other hand, in my case, I put the score and weight of sub-appraisal factors in the middle of the scale, because I have little experience of appraisal of non-transportation projects….(KDI analyst, interviewed 4th Dec 2012)*

On the other hand, policy analysts who have plenty of experience of PRP can carry out PRP with less effort than others. One expert who had experience in PRP said:

> *In my case, when I do the first appraisal of a project, it takes six months. It is not easy for less experienced policy analysts to make an appraisal in that time …. (Expert, interviewed 29th Nov 2012)*

For these reason, it may be supposed that less-experienced policy analysts are reluctant to take part in the PRP process and more-experienced policy analysts are more likely to take part in the PRP process.

2) Reasons for professors' non-neutral behaviour

Drawing on the previous analysis, we found that professors who took part in the PRP might advocate their own values (Promoter: intended tendency towards over-stating the AHP score; Blocker: intended tendency towards under-stating it) or have a hot bias towards either over-stating or under estimating (Dr Pangloss: unintended tendency towards over-stating the AHP score; Cassandra: unintended tendency towards under-stating it).

①**Reasons for issue advocacy** (Promoter: intended tendency towards over-stating the AHP score; Blocker: intended tendency towards under-stating the AHP score.)

Principal-agent relationship (with the MOSF) and policy subsystems (with spenders)

According to the previous analysis, as professors have similar information to that which spenders have, and more information than the MOSF has, relationships with spenders and the MOSF can be divided into four types: advocacy coalitions, policy subsystems (with spenders), principal-agent, and bottom line (with the MOSF).

Through the principal-agent model, we found the main reason for issue advocacy behaviour by professors could be seen as Promoter (Type 1: intended tendency towards over-stating the AHP score) and Blocker (Type 2: intended tendency towards under-stating it). As professors (agents) have more information than the MOSF (principal), professors who have different goals from the MOSF may be in a principal-agent relationship. In this case, the professors (agents) are likely to display behaviour that is

unacceptable to the principal (the MOSF), for example judging projects according to their own values. For this reason, professors' issue advocacy behaviour presents either an over-stating tendency or an under-stating tendency, and these can be explained by the professors' covert pursuit of their own interests, due to the information asymmetry between themselves and the MOSF.

On the other hand, through advocacy coalition and the policy subsystems model, we found another reason for the issue advocacy behaviour of professor. Professors had a relationship with spenders (agents) as principals. As spenders (agents) have a similar level information to professors (principals), professors who have the same goal as spenders may be in a policy subsystem. In the policy subsystems model, as the agents (spenders) share goals with the principals (professors), and discretion is granted to the agents as a result of trust, and monitoring occurs only incidentally in the continual process of consulting in policy subsystems (Waterman and Meier 1998), it may be that spenders present professors with selected information if they have goals in common.

②Reasons for hot bias towards over-estimating/under-stating the AHP score

(Dr Pangloss: unintended tendency towards over-stating the AHP score; Cassandra: unintended tendency towards under-stating the AHP score.)

Adverse selection model

As concerns hot bias, drawing on the interview results, we found that experienced professors were likely to have a hot bias which was related to their preconceptions, and they made less effort to appraise projects than inexperienced policy analysts. Considering this situation, MOSF officials, who make the same payment for the work of

all professors, were likely to give contracts to experienced professor who might have a hot bias and make less effort to appraise projects.

According to interviews, policy analysts who have a great deal of experience in PRP have more of a hot bias and less of a cold bias than others. One KDI analyst who discussed professors' behaviour said:

> *Some professors who have a great deal of experience in PRP may have certain preconceptions about projects which are related to their own area. In some cases these concern the downsizing of an industry in which they are involved, in which case they try to reflect their own views in the PRP process…(KDI analyst, interviewed 4th Dec 2012)*

3) Reasons for private company analysts' non-neutral behaviour

Drawing on the previous analysis, we found that private company analysts who took part in the PRP process might promote their clients' interests (promoter: intended tendency towards over-stating AHP score) or have a hot bias towards over-stating (Dr Pangloss: unintended tendency towards over-stating the AHP score).

①Reasons for client advocacy

(Promoter: intended tendency towards over-stating the AHP score)

Principal-agent model (with the MOSF) and policy subsystems (with spenders)

According to the previous analysis, private company analysts have relationships with spenders and the MOSF in policy subsystems and with the MOSF in a principal-agent model, because private company analysts have a similar level of information to spenders and more information than MOSF officials. As in policy subsystems, agents (spenders) share goals with principals (private company analysts), and as a result of the trust placed in them agents have discretion, with monitoring occurring only incidentally in the continual process of consulting (Waterman and Meier 1998); so spenders may present professors with selected information if they have goal consensus. On the other hand, in the principal-agent model, as agents are likely to display behaviour that is unacceptable to the principals (Waterman and Meier 1998, Dixit 2002), private company analysts (agents) may have a client advocate tendency which is incompatible with the MOSF's (principals') interests.

② Reasons for hot bias towards over-stating the AHP score

(Dr Pangloss: unintended tendency towards over-stating the AHP score.)

Adverse selection model

As private company analysts' goal is promoting their clients' interests, they may have a hot bias towards over-stating the AHP score. According to the interviews, principals (the MOSF) were likely to give contracts to biased private company analysts, because they had less information about policy analysts' tendency than policy analysts themselves had. Furthermore, it is important to recognize that available private company analysts are low level employees, due to the low payment for taking part in

the PRP, and experienced private company analysts may have certain preconceptions about projects, Thus the possibility of the MOSF to giving contracts to experienced and biased private company analysts may increase.

One private company analyst who talked about the limited source of analysts said:

> *Although my company has taken part in the PRP process, as the payment for appraisal is not high enough to compensate them, I have to consider whether to take part in the PRP process or not. For these reason there are few new companies that are likely to take part in the PRP process. (Private company analyst, interviewed 7th Dec 2012)*

7.3.3.3. Reasons for spenders' non-neutral behaviour

Drawing on the previous analysis, we found that spenders who took part in the PRP process might display two kinds of non-neutral behaviour: presenting their project in its best light at the PRP stage (Promoter: intended non-neutral behaviour with a tendency towards over-stating the AHP score), and constituency-support analysis (Dr Pangloss: unintended non-neutral behaviour with a tendency towards over-stating the AHP score).

Reasons for showing their project at its best at the PRP stage

(Promoter: intended non-neutral behaviour with a tendency towards over-stating the AHP score.)

According to the previous analysis, spenders have relationships with policy analysts in advocacy coalitions (with KDI analysts, or with some professors) and policy

subsystems (with private company analysts, or with some professors), because spenders (agents) have a similar information level to policy analysts (principals).

According to the advocacy coalitions model (Waterman, 1998), as agents (spenders) have a classic principal-agent relationship with some principals (those on the other side: KDI analysts and some professors) and a cooperative relationship with others (those on their side: private company analysts and some professors), spenders are likely to present selective information which may be unacceptable to those on the other side (KDI analysts and some professors) but acceptable to those on their side (private company analysts and some professors) to each policy analyst.

On the other hand, according to the policy subsystems model (Waterman, 1998), as agents (spenders) share goals with principals (policy analysts), discretion is granted to agents as a result of trust, and monitoring occurs only incidentally in the continual process of consulting, principals (private company analysts and some professors) whose goal is the same as that of the agent may have discretion as to the information they present to spenders (agents).

For these reason, it may be supposed that spenders' non-neutral behaviour can be explained by the relationships among stakeholders who have conflicting goals and information asymmetry between stakeholders.

7.4. How might those types of non-neutral behaviour which are not desired by MOSF be reduced?

7.4.1. Special features of the PRP and their implications for policy alternatives

According to the features of PRP and previous related research studies, the relationships among stakeholders in the PRP can be defined not only as public sector relationships but also as multi-tier and multiple-principal multiple-agent relationships. From these relationships, we found several specific features of the PRP which were related to policy implications for the control of non-neutral behaviour by stakeholders.

1) Multiple-principal multiple-agent models

► ***Implication 1: Concentration on advocacy coalitions and principal-agent relationships***

As seen in Figure 7-1, the middle tier (policy analysts) is composed of multiple actors such as KDI analysts, professors and private company analysts. Thus relationships among stakeholders in the PRP process might be defined as presenting a multiple-principal multiple-agent model. As seen in the previous analysis (see 7.3.2), relationships among stakeholders in the PRP are not a cauldron of conflict but are various and dynamic, according to both the level of information that principals and agents possess and the level of goal conflict (Waterman and Meier 1998). When it comes to implications for an alternative policy to the PRP, it is important to recognize that control of agents should be actively contested in advocacy coalitions and principal-

agent relationships where there is goal conflict among stakeholders and principals have limited information. Thus, the policy alternative should be concentrated on these two types of relationship.

2) Multi-tier relationship

►***Implication 2: Top tier (MOSF) should give the intermediate tier (policy analysts) enough incentives***

As seen in Figure 7-1, as policy analysts (KDI analysts, professors and private company analysts) are the principal for spenders and agents at the MOSF, relationships among stakeholders in the PRP might be defined as presenting a multiple-tier model. The expected strong point of setting up such a hierarchical system might be that the intermediate tier can gain expertise and information, and they can reduce the information asymmetry between the higher tier and the lower tier. However, it also raises the possibility of collusion between members of the intermediate tier and those of the lower tier who have the same goals as each other (Dixit 2002). According to the previous analysis (see 7.3.3.), most private company analysts and some professors whose goals are similar to those of spenders are likely to allow spenders to present professors with selected information if they have goal consensus *(policy subsystems)*.

When it comes to the implications for an alternative policy to the PRP process, according to Dixit (2002), it is important to recognize that if the intermediate tier obtains selected information, it may offer to keep silent in exchange for the promise of a well-paid sinecure after early retirement from the public sector, or the promise of taking

part in an advantageous way in the implementation of a project. Thus, the top tier (MOSF or KDI managers) should give the intermediate tier enough of an incentive to report truthfully when they get the signal that the lower tier is presenting selected information (Dixit 2002).

3) Diverse incentives for public sector agents

► ***Implication 3: Diverse incentives (e.g. indirect, non-monetary) can be adopted***

According to Jackson (2011, p. 21), 'if some activities are more highly rewarded than others then there will be a strong incentive to shift the allocation of resources and effort to maximizing these activities which attract the highest rewards'. For this reason, proper reward might be very important to reduce the non-neutral behaviour. According to Dixit (2002), public agents may get utility not only from money but also from non-monetary factors. Although the general theory of incentives argues that an agent gets utility solely from money, in reality, agents may get utility from some aspects of the task itself. On the other hand, one important motivation for agents may be professionalism, which can be defined as 'receiving important occupational rewards from a reference group whose membership is limited to people who have undergone specialized formal education and have accepted the group-defined code of proper conduct'(Wilson 1989). This professionalism goes naturally with career concern.

When it comes to the implications for an alternative policy to the PRP, it is important to recognize that if agents get utility from other, non-monetary factors, the principal can pay agents a lower monetary incentive in order to induce a proper level of behaviour.

Thus diverse incentives can be adopted in the PRP to secure a certain level of effort and the same level of disclosure of information.

4) Inter temporal aspects

► ***Implication 4: Sustained repeated relationships among stakeholders are important***

In the PRP process, most principal-agent relationships develop over time, because PRP is implemented by the KDI and managed by the MOSF, and the KDI manage the pool of policy analysts. In this relationship, the agent takes action several times and the principal observes the outcome several times. In these repeated relationships, reputation and career concern may play an important role in controlling the agent.

Reputation may help mitigate the moral hazard on the principal's side. If the principal is in business for a long time, a reputation for particular behaviour can affect his ability to attract agents to work for him later and elsewhere. On the other hand, in an adverse selection problem, repetition creates scope for building a reputation relating to one's type (Dixit 2002). In view of career concerns, it may be unnecessary to provide explicit incentives to induce effort in the early stages of PRP process. The prospect of indirect incentives in the form of better future rewards may suffice.

When it comes to the implications of alternative policies for the PRP, it is important to recognize, if the relationships are repeated, that agents consider their reputation and career as important. Thus to sustain repeated relationships among stakeholders is important; and indirect and non-monetary incentives may be important in these repeated relationships.

5) Lack of competition

►***Implication 5: Adopting a competitive system for the PRP managing institute***

In contrast to the private sector, where a profit-seeking firm gets powerful external incentives from its competition with other firms, most public or quasi-public service agencies have usually been monopolies (Dixit 2002). As PRP is implemented only by the KDI, there may be a lack of competitions in the PRP process. Due to this lack of competition, lack of attention to objective analysis and poor quality of analysis can occur.

However, it is important to recognize that due to specific aspects of public principal-agent relationships, such as multiple principals and multiple dimensions, exposing public sector agents to competition or privatizing the activity completely does not always work. Thus, not only the possibility of increasing efficiency and preventing moral hazard and adverse selection, but also specific aspects of the relationships in the PRP process, such as multiple principals and multiple dimensions, should be considered carefully when adopting a competitive system in PRP.

7.4.2. Policy alternatives

1) Policy Alternative 1

Make available the weighting set results of each policy analyst, with their name

There is no information about the weighting sets of each policy analyst in current PRP reports, although these reports are open to the public. However, according to the principal-agent theory, the availability to the public of this information is very important in terms of solving the principal-agent problem. Thus, the availability to the public of the weighting set results of each policy analyst, with the analysts's name attached, may be one of the policy alternatives for the solving the problem of non-neutral behaviour.

From the second interviews, we found that most stakeholders who took part in the PRP agreed with making public policy analysts' weighting set results, with the analysts' names, through the project reports. As seen in Table 7-18, twenty one out of 32 interviewees agreed (11 out of 32) or partly agreed (10 out of 32) with Policy Alternative 1. Most interviewees who agreed with this policy analternative stated that making public policy analysts' weighting set results would push policy analysts into a more neutral position when they took part in the PRP, because they would not want to be considered as biased policy analysts by other stakeholders.

Only seven interviewees did not agree with adopting Policy Altenative 1. They were concerned that if the weighting set results of each policy analyst were made public, policy analysts might feel the consequences of their judgement to be a heavy burden,

and thus they might be reluctuant to reveal the results of their own expertise or judgment when these differed significantly from those of other policy analysts.

Table 7-18: Opinions of stakeholders on Policy Alternative 1

(Unit: number of persons)

		Agree	Partly agree	Neutral	Not agree	Total
Spenders	Local government	2	0	0	0	2
	Agent	3	0	0	0	3
	Line-ministry	3	2	0	0	3
	Sub-total	**8**	2	0	0	10
Policy analysts	KDI analyst	0	0	1	2	3
	Professor	0	2	1	1	4
	Private company	1	1	1	1	4
	Sub-total	1	**3**	**3**	**4**	11
MOSF		1	3	0	2	6
Expert		1	2	1	1	5
TOTAL		**11**	**10**	4	7	32

2) Policy Alternative 2

Separate scoring and weighting processes

The first interview results showed that, in contrast to PRP guidelines, policy analysts were likely to decide the score and weight of each sub-appraisal factor at the same time. This suggested that some policy analysts were able to manipulate their PRP results through considering the score and weight at the same time. Thus, ‘separating the scoring and weighting processes’ could be one of the policy alternatives for solving the problem of non-neutral behaviour.

From the second interviews, we found that most stakeholders who took part in the PRP agreed with separating the scoring and weighting processes. As seen in Table 7-19,

twenty six out of 30 interviewees agreed (19 out of 30) or partly agreed (7 out of 30) with Policy Alternative 2, while none of the interviewees disagreed with this policy alternative. Most interviewees stated that as the expertise of policy analysts and their subjective judgement on each project could be reflected in the weighting process, in order to protect PRP results from the opportunistic behaviour of policy analysts pursuing their own interests, the scoring process would be better separated from the weighting process, according to the PRP guidelines.

However, four interviewees stated that this policy alternative might not work, if policy analysts wanted to reflect their biased opinions in the PRP results, because, even though the two processes were separated from each other, biased policy analysts could manipulate the PRP results through manipulating the score of projects at the scoring stage.

Table 7-19: Opinion of stakeholders on Policy Alternative 2

(Unit: number of persons)

		Agree	Partly agree	Neutral	Total
Spenders	Local government	0	2	0	2
	Agent	3	0	0	3
	Line-ministry	5	0	0	5
	Sub-total	**8**	2	0	10
Policy analysts	KDI analyst	1	0	2	3
	Professor	3	1	0	4
	Private company	2	2	0	4
	Sub-total	6	**3**	2	11
MOSF		4	1	0	5
Expert		1	1	2	4
TOTAL		**19**	7	4	30

3) Policy Alternative 3

Exclude biased policy analysts from the PRP

As the interview results show, by contrast with other stakeholders, most private company analysts were seen as pursuing client advocacy (intended over-stating tendency), and some policy analysts constantly exhibited a certain tendency. Thus, excluding biased analysts, especially private company analysts, from the weighting process could be one of the policy alternatives for solving the problem of non-neutral behaviour.

From the second interviews, we found that most stakeholders who took part in the PRP agreed with excluding biased policy analysts from the PRP. As seen in Table 7-20, twenty six out of 31 interviewees agreed (19 out of 31) or partly agreed (7 out of 31) with Policy Alternative 3. They stated that analysts whose biased behaviour was consistently noted should be excluded from the pool of policy analysts, in order to increase the objectivity and expertise contributed to the PRP results. On the other hand, four interviewees were concerned that if biased policy analysts were excluded from the PRP, especially private company analysts, who were considered to be constantly biased, and whose over-stating of AHP scores was noted in the first interview results, these analysts' expertise in cost estimating might also be excluded from the PRP. Considering this concern, it might be a better policy alternative to exclude private company analysts from the weighting set process, while allowing them to take part in the cost estimating process.

Table 7-20: Opinion of stakeholders on Policy Alternative 3

(Unit: number of persons)

		Agree	Partly agree	Neutral	Disagree	Total
Spenders	Local government	2	0	0	0	2
	Agent	3	0	0	0	3
	Line-ministry	4	1	0	0	5
	Sub-total	**9**	1	0	0	10
Policy analysis	KDI analyst	0	0	1	2	3
	Professor	3	1	0	0	4
	Private company	1	0	0	2	3
	Sub-total	4	**1**	**1**	**4**	10
MOSF		3	3	0	0	6
Expert		3	2	0	0	5
TOTAL		**19**	**7**	1	4	31

4) Policy Alternative 4

Monitoring policy analysts' behaviour and reflecting the results in their performance and personnel management

According to the Evaluation Research Institute, evaluating and monitoring the consequence for PRP results of the non-neutral behaviours of stakeholders, and reflecting the results in the stakeholders' performance and personnel management, could be one of the policy alternatives for the solving the problem of non-neutral behaviour.

From the second interviews, we found that most stakeholders who took part in the PRP agreed with monitoring policy analysts' behaviour and reflecting the results in their performance and personnel management. As seen in Table 7-21, twenty three out of 31 interviewees agreed (15 out of 31) or partly agreed (8 out of 31) with Policy Alternative 4. They stated that giving incentives to stakeholders who did not exhibit biased

behaviour in PRP through monitoring policy analysts' behaviour and reflecting the results in their performance and personnel management might increase the objectiveness of PRP results. On the other hand, five interviewees were concerned that the monitering of policy analysts and the measuring of biased behaviour might be impossible, because the task of policy analysts in PRP might be too reliant on their expertise for their behaviour to be measured exactly.

Table 7-21: Opinions of stakeholders on Policy Alternative 4

(Unit: number of persons)

		Agree	Partly agree	Neutral	Disagree	Total
Spenders	Local government	2	0	0	0	2
	Agent	2	0	0	1	3
	Line-ministry	2	2	0	1	5
	Sub-total	**6**	2	0	2	10
Policy analysts	KDI analyst	1	1	1	0	3
	Professor	2	1	1	0	4
	Private company	2	0	1	1	4
	Sub-total	5	**2**	**3**	**1**	11
MOSF		2	3	0	1	6
Expert		2	1	0	1	4
TOTAL		**15**	**8**	3	5	31

5) Policy Alternative 5

Adopting a competitive system for choosing the institution managing PRP

According to the public principal-agent model, lack of competion can be one of the main reasons for non-neutral behaviour. Thus, adopting a competitive tendering approach to appointing the institution managing PRP could be one of the policy alternatives for tackling non-neutral behaviour.

From the second interviews we found that, in contrast to other policy alternatives which were preferred by most stakeholders, about half of the interviewees were neutral or opposed to adopting Policy Alternative 5. As seen in Table 7-22, seventeen of the 31 interviewees agreed (six out of 31) or partly agreed (11 out of 31) with Policy Alternative 5. They stated that as the private market, in which there was perfect competition among actors, ran more efficiently, the PRP might also be more efficient and more trusted by stakeholders if other management institutions were allowed to take part in PRP as the managing agency. However, 14 interviewees were concered about adopting another institution as the managing agency in PRP, because, in a situation of fierce competition between institutions seeking to act as the managing agency, policy analysts might try to form advantageous relationships with other stakeholders in order to survive in the competition, and the task of policy analysts in PRP might be too reliant on expertise for their behaviour to be measured exactly.

Table 7-22: Opinion of stakeholders on Policy Alternative 5

(Unit: number of persons)

		Agree	Partly agree	Neutral	Disagree	Total
Spenders	Local government	2	0	0	0	2
	Agent	2	1	0	0	3
	Line-ministry	1	4	0	0	5
	Sub-total	**5**	**5**	0	0	10
Policy analysts	KDI analyst	0	0	2	1	3
	Professor	0	1	0	3	4
	Private company	1	1	1	0	3
	Sub-total	1	**2**	**3**	**4**	10
MOSF		0	3	2	0	5
Expert		0	1	1	4	6
TOTAL		**6**	**11**	6	**8**	31

7.5. **Conclusion**

This chapter has shown the existence of, the extent of, and the reasons for non-neutral behaviour by stakeholders in the PRP. Also, it has suggested policy alternatives for improving the PRP system. In order to explore these questions, it has employed qualitative analysis based on multiple case studies from 16 projects in which RBS decisions might be changed by changing their weightings and setting the same weighting for each project.

With respect to the existence of non-neutral behaviour by stakeholders in the PRP, we found that this could be divided into four types, according to their intentionality and the direction of their tendency:① Promoter (Type 1: Intended non-neutral behaviour with over-stating the AHP score), ② Blocker (Type 2: Intended non-neutral behaviour with a tendency towards over-stating the AHP score), ③ Dr Pangloss (Type 3: Unintended non-neutral behaviour with a tendency towards over-stating the AHP score), and ④ Cassandra (Type 4: Unintended non-neutral behaviour with a tendency towards under-stating the AHP score).

As for the reasons for non-neutral behaviour by stakeholders in the PRP, we have established these through exploring multi-tier relationships and multiple-principal multiple-agent relationships.

Lastly, we have suggested possible policy alternatives for improving the PRP system. In order to generate these policy alternatives, we reviewed the special features of the PRP

as a public relationship between public actors, including features such as multi-tier and multiple-principal multiple-agent relationships, diverse incentives for public sector agents, inter-temporal aspects and lack of competition. Considering these factors and the results of the first interviews, we proposed several policy alternatives; ① making public the weighting set results of each policy analyst, together with the analyst's name ② separating the scoring and weighting processes ③ excluding biased policy analysts from the PRP process ④monitoring policy analysts' behaviour and reflecting the results in their performance and personnel management ⑤ adopting a competitive system for the PRP managing institution .

The detailed meanings of these findings will be discussed in Chapter 8.

The next chapter will explore the implications and contributions of considering the results of each empirical analysis within the methodological and conceptual frameworks in this study. It also provides the key findings of the thesis from the analysis of each empirical study. And, finally, it provides the opinions of each stakeholder on the findings of our study and, in the light of this feedback, our final revisions to those findings.

CHAPTER 8 DISCUSSION

8.1. Introduction

This chapter interprets and discusses in detail several issues which were raised by the findings from the analysis for each research question, and distinguishes this study's unique contribution to knowledge and policy making from the contributions and limitations of previous studies.

The first section interprets the factors which affect budget selection (BS) and budget pace (BP) decisions, and explains the reasons for these findings in the context of the Korean PRP.

The second section interprets the impact of current PRP methodology on recommendations for budget selection (RBS) decisions, and the opinions of stakeholders on the current PRP methodology. Furthermore, it interprets the impact of five policy alternatives for the current PRP methodology and discusses the opinions of stakeholders on these.

The third section interprets and discusses the opinions of interviewees on non-neutral behaviour by analysts. We focus on three issues in this section: the appropriateness of the division of non-neutral behaviour by stakeholders into four types, the appropriateness of the model for exploring the reason for the non-neutral behaviour of

stakeholders in the PRP, and the feasibility of policy alternatives for reducing the non-neutral behaviour of stakeholders.

The fourth section evaluates the validity and reliability of the quantitative and qualitative approaches used in this thesis for analysis and exploring each research question.

Finally, the chapter will discuss the contribution of this thesis to the knowledge that informs the work of policy makers.

8.2. Implications of the analysis for Research Question 1

8.2.1. The impact of RBS decisions and other factors on BS decisions

According to the analysis for Research Question 1-① (What is the impact of PRP results on BS decisions (controlling for other factors)?), 'RBS decisions (AHP≥0.5 or not) play a positive role in BS decisions, while SHARE ('sharing the budget burden between central government and other stakeholders)' plays a positive role in BS decisions in a statistically significant way, at the level of 0.01 from 2003 to 2010.

These findings have following implications. Firstly, they imply that the current PRP has accomplished its aim. According to the KDI, the aim of the PRP is to enhance fiscal productivity by launching large-scale projects based on transparent and objective ex ante project evaluations. Thus, if the RBS decisions which are produced by the PRP affect the BS decisions on large-scale projects, this might imply that the current PRP

has accomplished its aim. The Nagelkerke R Square of this analysis is 0.491, which means that the variance in the RBS decision accounts for 49.1 per cent of the variance in the BS decisions. Thus, this result might suggest that RBS decisions affect BS decisions to a considerable extent. Furthermore, in the first round of interviews, most interviewees replied that the PRP had accomplished its aim: to a large extent (27 interviewees out of 39), or to a small extent (12 interviewees out of 39). These finding suggest that the PRP has accomplished its aim.

Secondly, the results of research question 1-① imply that the policy analysts who took part in the PRP played an important role in BS decisions. According to previous research, the effect of policy analysts on decision-making is limited, because the role of policy information in the decision-making process is supportive, indirect and limited. However, this research suggests that, as PRP results play an important role in BS decisions in Korea, policy analysts who take part in the PRP play an important role in these decisions.

Thirdly, among the five control variables, only SHARE (sharing the budget burden between central government and other stakeholders) had a positive relationship with BS decisions. This finding means that the projects which were funded not only by central government but also by other stakeholders, including local government, got budget approval more easily than the other projects did.

8.2.2. The impact of AHP scores and other factors on BP decisions

According to the analysis for Research Question 1-② (What is the impact of PRP results on BP decisions (controlling for other factors)?), AHP scores played a statistically significant positive role in BP decisions for projects in the mid-term and long-term years, at the level of 0.01, from 2003 to 2012. On the other hand, SIZE (size of projects) played a statistically significant negative role in BP decisions in the mid-term and long-term years, at the level of 0.05, from 2003 to 2012. Thirdly, SHARE (sharing the budget burden between central and local government) played a positive role in BP decisions, in the mid-term year, at the level of 0.05, from 2003 to 2012. Lastly, CAPITAL (geographical area of project) played a positive role in BP decisions in the mid-term year, at the level of 0.05, from 2003 to 2012. However, the impact of this feature in the long-term year was not clearly established.

These findings have following implications. Firstly, they imply that MOSF officials considered the AHP score to be a good indicator for deciding the annual budget allocation on large-scale projects. It means that the projects which had higher AHP scores could be constructed more quickly because they received a budget allocation more swiftly than those with low AHP score projects. In contrast to the effect of RBS decisions, which, in line with the guidelines, can be expected to prevent 'not-recommended' projects from getting BS approval, this finding is more unexpected, because, there is no guideline which recommends MOSF officials to consider the AHP score as an indicator for the BP decision. Some might concern about this result, because the use of an AHP score should be considered in the context of its scale methodology,

which converts the B/C ratio into an AHP score. For example, as a nine-point scale enlarges the differences between the critical points on the scale, RBS decisions (AHP >0.5, or not) is suitable for use in decisions on budget approval for large-scale projects. However, the AHP score might not be an accurate indicator for BP decisions. Furthermore, the first round of interviews showed that five out of six MOSF officials did not know about this scale methodology, which was designed to facilitate more accurate distinction between projects for which the B/C ratio was in the critical range (around B/C =1). In the second round of interviews, 20 out of 31 interviewees stated they were not concerned about using the AHP score in the BP decision. However, 11 interviewees were concerned about using the AHP score in the BP decision. They thought that the AHP score might not be a good indicator for BP decisions, because it is produced on a nine-point scale which is suitable for distinguishing between projects to recommend for BS rather than for reaching BP decisions.

Secondly, with respect to the control variables, among the six control variables, only two (in the long-term) or three (in the mid-term) variables had a relationship with BP decisions. As SHARE (sharing the budget burden between central and local government) and SIZE (program size in the context of central government budget expenditure) are related to central government budget expenditure, these results imply that MOSF officials, who make BP decisions, consider minimizing expenditure as an important goal. On the other hand, CAPITAL (geographical area of project)) is related to the degree to which there is a geographical relationship among projects and to the population density of project areas, so these results imply that the greater a project's geographical relationship with other projects and the higher the population density of

the area of the project, the more quickly the project will be constructed, because it will receive a budget allocation more swiftly than projects based in other areas.

When it comes to comparing the mid and long-term, in the mid-term, three control variables (SHARE, SIZE, and CAPITAL) had a relationship with BP for large-scale projects with adjusted R square 0.228, while in the long-term year, only two control variables (SHARE, and SIZE) had a relationship with BP for large-scale projects with an adjusted R square of 0.206. These results mean that in the mid-term year, the variance of 23 per cent in the accumulated budget allocation ratio for large-scale projects can be explained by four expected variables (including the AHP score), while, in the long-term year, the variance of 21 per cent in the accumulated budget allocation ratio for large-scale projects can be explained by three expected variables (including the AHP score).

8.3. Implications of the analysis for Research Question 2

8.3.1. The impact of current PRP methodology on RBS decisions

According to the analysis for Research Question 2-① (What are the effects of the current PRP methodology on RBS decisions?), there were two important findings, as follows.

Firstly, as concerns the impact of the nine-point scale methodology on RBS decisions, four and seven per cent of projects' RBS decisions were found to be changed if the RBS decision was re-calculated by the author changing the nine-point scale into a balanced

scale. Furthermore, all the projects for which RBS decisions were found to be changed had the decision changed from ‘not-recommended’ to ‘recommended’ when the scale methodology was changed from a nine-point scale into a balanced scale methodology.

Secondly, as concerns the impact of the current weighting methodology on RBS decisions, about 10 per cent of projects’ RBS decisions (AHP≥0.5) were changed by the author changing the actual weighting which was variable between projects into a single weighting which was held constant across projects. Furthermore, in 16 out of 17 projects the RBS decision was changed from ‘recommended’ to ‘not-recommended’ when the weighting set for the appraisal sub-factors was changed into one fixed weighting.

The implications of the results of nine-point scale methodology for RBS decisions

Firstly, the scale methodology used to convert the B/C ratio into AHP score plays an important role in making RBS decisions. Our analysis showed that four and seven per cent of projects’ RBS decisions were changed by changing the nine-point scale into a balanced scale.

Secondly, it might be more difficult for projects which had a relatively low B/C ratio to obtain a ‘recommended’ decision with nine-point scale methodology than with balanced scale methodology. We examined the sensitivity of RBS decisions to the method used for incorporating B/C ration in the AHP score. The KDI uses a nine-point scale. When we experimented by substituting a balanced score in the calculation, we found that four and seven per cent of projects’ RBS decisions could have changed from not-

recommended' to 'recommended'. Thus, the nine-point scale might be better for ruling out inefficient projects (B/C ratio <1.0) in the PRP than the balanced scale is.

The implications of the results of current weighting methodology on RBS decisions

Firstly, weighting methodology plays an important role in making RBS decisions. Our analysis showed that about 10 per cent of projects' RBS decisions (AHP≥0.5 or not) were changed by changing the current weighting into one fixed weighting.

Secondly, it might be suggested that policy analysts had a generous tendency when they took part in the PRP. According to analysis, 16 out of 17 projects had their RBS decisions changed from 'recommended' to 'not-recommended' when the actual weightings set for appraisal sub-factors were experimentally changed by author into one fixed weighting. Furthermore, in the first round of interviews, we found that policy analysts had discretionary power over the weightings for each project, through setting these according to the overall judgment on projects that they formed during the PRP (11 out of 17 policy analysts) and through putting emphasis on specific factors which were determined before the PRP (six out of 17 policy analysts). Thus we realized that some policy analysts were likely to pass their favoured projects through their discretionary power over the weightings set for appraisal sub-factors.

Thirdly, policy analysts were likely to set higher weightings on projects which had higher scores for the policy factor and regional factor, which were produced by the subjective judgment of policy analysts. The analysis showed that on the 16 projects on which the RBS decision would be changed from 'recommended' to 'not-recommended'

if policy analysts did not have discretionary power when they set the weightings, the score and weighting for policy and regional factors were related more strongly to each other than they were for the other projects. Furthermore, in the first round of interviews, six out of eight interviewees stated that they considered the score and weighting at the same time when they appraised projects. From these results, we realized that policy analysts were likely to manipulate the weighting on each project according to its score, in order to reflect their subjective judgments, when they took part in the PRP.

8.3.2. The appropriateness of current PRP methodology

The analysis for Research Question 2-② (What are the views of stakeholders in the PRP on whether the current PRP methodology leads to appropriate RBS – and what are the reasons for these views?), produced two important findings and the implications of these are as follows.

The appropriateness of the current nine-point scale methodology

With respect to opinions on the current nine-point scale methodology, although most policy analysts were not concerned about this, some other stakeholders were. The reasons for concern about the nine-point scale can be divided roughly into three: enlargement of the effect of some specific ranges of the B/C ratio; inaccuracy of the B/C ratio; and too great a difference between the scale points. On the other hand, the reasons for finding the current of nine-point scale acceptable can be divided roughly into two: the increased possibility of distinguishing between the B/C ratios of projects

which gather around B/C = 1; and the increase in the impact of the B/C ratio, which is produced objectively, on AHP scores.

This finding has the following two implications. Firstly, the current nine-point scale methodology is not supported by all the stakeholders who have taken part in the PRP, and opinions about the usefulness of the nine-point scale as current PRP methodology differ according to stakeholders. In the first round of interview results, most policy analysts (11 out of 14) supported the use of the nine-point scale, but most other stakeholders (15 out of 18 interviewees) were concerned about it.

Secondly, the current nine-point scale can be supported if KDI reduces the difference between the scale points and increases the accuracy of the B/C ratio calculation by refinement of the standard for making B/C ratio. Considering the aim of the PRP, which is to produce RBS decisions (AHP $\geq$ 0.5 or not) among similar projects, and considering that 41 per cent of projects (82 out of 204) had their B/C ratio between 0.8 and 1.2, helping to distinguish between the B/C ratios of the projects which gather around B/C = 1 may be an important function of the PRP. Thus, the nine-point scale can be justified in terms of the aim of the PRP. However, it is important to recognize that there were concerns about the inaccuracy of the B/C ratio calculation and too great a difference between the scale points in the current nine-point scale methodology. So, according to the interview results, the current nine-point scale might be supported on the condition that KDI reduces the difference between the scale points and increases the accuracy of the B/C ratio calculation by refinement of the standard for making B/C ratio.

The appropriateness of the current weighting methodology

When it comes to opinions on the current weighting methodology, most spenders oppose this and most the other stakeholders support it. The main reason for supporting the current weighting methodology is that policy analysts can reflect their own judgment of a project by manipulating the weighting set for appraisal sub-factors. On the other hand, the main reason for opposing the weighting methodology is that the current methodology gives too much discretion to analysts. In particular, local government officials who are involved in other projects consider the reduction in predictability for spenders of the PRP results to be the main problem of the current methodology.

This finding has following implications. Firstly, the current weighting methodology was not supported by all stakeholders who took part in the PRP, and opinions about using the current weighting methodology differed between different stakeholders. According to the first-round interview results, most spenders oppose the current weighting methodology; but most the other stakeholders, especially policy analysts, support it.

Secondly, reducing policy analysts' discretion on setting weightings might be one possible alternative to the current weighting methodology. In the first round of interviews, some interviewees, especially spenders, argued that 'the same weighing set for each project' could be an alternative to the current weighting methodology. This means that they do not want to allow policy analysts to have discretionary power over the weights set for projects. However, other stakeholders were concerned that although this alternative might be a transparent and objective method, policy analysts could not

reflect their subjective judgments on projects which they could not know about before the PRP and which might differ from project to project. On the other hand, for some interviewees, especially some MOSF officials and some experts, putting 'the same weighting on projects which are belonged to same project type' could be an alternative to the current weighting methodology. They argue that this could reflect the differences in each type of project's character through setting different weightings for each type, and it could prevent subjective judgments among the same kind of projects through setting the same weightings for the same types of project. However, some interviewees argued that there were two weak points in this alternative: ① it cannot reflect the differences between the characters of projects which are in same project type; and ② it may raise the issue of how to classify the types of projects and how much difference to allow in the weightings set for the different types.

On the other hand, considering the aim of the PRP, which is to enhance fiscal productivity by subjecting large-scale public investments to transparent and objective ex-ante project evaluation, the process should be implemented transparently and objectively. Furthermore, according to the results of the first round of interviews, policy analysts set different weightings for appraisal sub-factors on each project in order to reflect their own subjective judgments in projects which undergo the PRP. Consequently, the current weighting methodology, which allows policy analysts discretion on setting the weightings, might be justified if it is used transparently and objectively. In the previous alternative (reducing the policy analysts' discretion), there is a trade-off between transparency/objectiveness and the reflection of the expertise of policy analysts. However, some interviewees, especially experts, argued that policy

analysts might be allowed to keep their discretionary power on setting weightings for projects, but be constrained by the weightings they chose being available to the public, they might be reluctant to use this power opportunistically for purposes beyond reflecting their expertise on projects.

8.3.3. The policy alternative to current PRP methodology.

The impact of alternative PRP methodology on RBS decisions

According to the analysis for Research Question 2-③ (What would be the effect of possible alternative PRP methodologies on RBS decisions?), each type of alternative methodology had a different effect on RBS decisions. An RBS decision might be decided by the joint effect of an alternative scale and weighting methodology. The balanced scale methodology might better enable projects which have a relatively low B/C ratio to be successful in the PRP than the nine-point scale does. On the other hand, having the same weighting methodology might help prevent policy analysts from having the ability to be generous towards projects which have a higher score for policy factors than other projects.

Furthermore, according to the results of the analysis, a maximum of 16 projects' RBS decisions (out of 167) were changed from 'recommended' to 'not-recommended' by changing the PRP methodology. We found that these projects' mean policy scores were higher than those of all the projects and the means of their B/C ratio and regional scores were lower than those of all the projects. On the other hand, a maximum of nine projects' RBS decisions were changed from 'not-recommended' to 'recommended' by

changing the PRP methodology. We found that these projects' mean regional scores were higher than those of the projects as a whole, and the means of the B/C ratio and policy score were lower than those of all the projects.

These findings have the following implications. Firstly, each alternative methodology affected RBS decisions differently. From these results, we can estimate the effect of changing the PRP methodology on the RBS decisions of specific kind of projects.

Secondly, as seen from the results of Research Sub-question 2-②, each alternative for the current nine-point scale methodology and current weighting methodology has its own justification as an alternative for current PRP methodology. We used the second round of interviews to explore whether the alternatives which were made jointly by each alternative for scale and weighting methodology could be justified.

The opinion of stakeholders on alternative PRP methodology

According to the second round of interviews, we found that stakeholders' favourite potential alternatives for PRP methodology were Type 3 (balanced scale methodology + same weightings for projects within the same project type), Type 1 (balanced scale methodology + different weightings for each project), Type 2 (nine-point scale methodology + same weightings for projects within the same project type) and current methodology (nine-point scale methodology + different weightings for each project), in that order.

These findings have the following implications. Firstly, Type 3 is the leading candidate for a policy alternative to current PRP methodology. According to the second interviews, most interviewees (17out of 31) consider Type 3 as their favorite policy alternative. However, considering the first and second interview results, there is not enough consensus for adopting this policy alternative. Instead, it would be useful for a preliminary study of how projects might be grouped and how much difference in the weightings set might be appropriate should be carried out and the results of such an analysis discussed. Although, in this research a simple version of such a study was carried out, using several balanced scale methodologies and putting projects into two groups (transportation projects and others), the detailed analysis of these factors that would be needed to create a practical alternative might be left to a future study of the area investigated by this thesis.

Secondly, the status quo (keeping the current methodology) could be one option, if there was some minor adjustment of the methodology. According to supplementary interviews, four interviewees (two KDI analysts and two experts) preferred to maintain the current PRP methodology. They argued that the current methodology had strong points which were of practical importance in implementing PRP. Current methodology enabled the AHP score reflect the policy analysts' subjective judgment and increasing the possibility of the AHP score distinguishing between similar projects. Considering the first and second interview results, before this policy alternative is adopted, several preliminary studies should be implemented and discussed, such as, ① an investigation of the difference between scale points needed to increase the possibility of distinguishing between similar projects and reflecting accurately the differences

between them, and ② a study of ways of preventing policy analysts from using their discretionary power exaggeratedly when they set weightings for sub-appraisal factors. The first study might be left to future research in the area investigated by this thesis, while the second can be explored in this thesis (Chapter 7).

8.4. Implications of the analysis for Research Question 3

8.4.1. Appropriateness of the division of non-neutral behaviour by stakeholders into four types

Drawing on the interview results, we found that non-neutral behaviour by stakeholders in the PRP could be divided into four types according to their intentionality and the direction of their tendency, as follows:

Table 8-1: Non-neutral behaviour according to intentionality and direction of their tendency

		Tendency	
		Over-stating AHP score	**Under–stating AHP score**
Intentionality	**Intended**	**Promoter (Type 1)**	**Blocker (Type 2)**
		▪ Client advocacy ▪ Issue advocacy ▪ Showing their project at its best at the PRP stage ▪ Affected by political pressure	▪ Issue advocacy
	Un intended	**Dr Pangloss (Type 3)**	**Cassandra (Type 4)**
		▪ Hot bias ▪ Constituency-support analysis	▪ Hot bias ▪ Regards PRP as naïve

As seen from Table 8-1, Promoter behaviour (Type 1) can be defined as intended non-neutral behaviour with a tendency towards over-stating the AHP scores of projects. Blocker behaviour (Type 2) can be defined as intended non-neutral behaviour with a tendency towards under-stating the AHP scores of projects. Dr. Pangloss behaviour (Type 3) can be defined as unintended non-neutral behaviour with a tendency towards over-stating the AHP scores of projects. Lastly, Cassandra behaviour (Type 4) can be defined as unintended non-neutral behaviour with a tendency towards under-stating the AHP scores of projects.

With respect to the appropriateness of the four types of non-neutral behaviour of stakeholders in the PRP, some may dispute that the tendency toward under-stating AHP scores exists, because previous research has not directly refer to such an effect. Others may also argue that advocacy may not be different from hot bias, because the results of these two non-neutral behaviours look similar to each other.

Existence of tendency toward under-stating AHP scores

The existence of an optimistic tendency leading to 'cost overruns and benefit shortfalls' has been noted by previous researchers (Flyvbjerg 2009) and the Greed Book (Treasury 2011), but the opposite effect of a pessimistic statement of benefit cost ratio has not been preciously suggested in the literature. From an interview results, we argue that there has been tendency toward over-stating AHP score in the PRP.

Firstly, according to previous research on non-neutral behaviour of stakeholders, although, this did not mention the existence of tendency toward under-stating AHP

scores, we can draw implications from them about the existence of this tendency. For example, in the issue advocacy model, policy analysts would change methodology or use other data to change the results of analysis if these were different from their valuations of policy. We argue that there is a possibility that under-stating AHP score could be also exists depending on policy analysts' value chains. On the question of hot bias, which was unintentional, but directionally motivated, policy analysts who had this tendency might have a tendency to search for information that confirmed, or interpret information in a way that confirmed, their preconceptions. Hot bias might lead to over-stating AHP score, but also under-stating AHP score according to analysts' perceptions of projects.

Secondly, in the first round of interviews, we found the existence of tendency toward under-stating AHP scores. For example, we found that some professors who wanted to prevent projects they disapproved of as a result of their own values might have a tendency toward under-estimating. Furthermore, the behaviour of many of KDI analysts and professors who had a tendency to search for information that confirmed, or could be interpreted as confirming, their preconceptions about projects they did not favor, might produce a tendency toward under-estimating. Most MOSF officials who distrusted PRP results and asked for the PRP scores to be reconsidered might have a tendency toward under-stating the AHP score.

Lastly, in the second round of interviews, we found that most interviewees who had experience of taking part in the PRP agreed with the classification of non-neutral behaviour we were using. Twenty eight interviewees out of 32 stated that the method of

classifying the non-neutral behaviour into four types according to their intentionality and the direction of their tendency was appropriate. Consequently, considering the relevant literature, in the case study (first interviews) and the second interviews, the existence of tendency toward under-stating AHP scores in the PRP was confirmed.

The difference between advocacy and hot bias

With respect to the possibility of distinguishing between advocacy and hot bias, we found that these can be distinguished as follows.

Firstly, according to previous research, they can be divided according to the intentionality of policy analysts who exhibited non-neutral behaviour. According to MacCoun (1998) non-neutral behaviour is intentional when policy analysts are aware of their tendency and choose to express it when they could choose not to. From this point of view, we can distinguish advocacy from hot bias according to the awareness of policy analysts of their own non-neutral behaviour when they exhibit this.

Secondly, some researchers argue that advocacy might be related to the values or goals of policy analysts in the PRP (Weimer and Vining 2005), whilst hot bias might be related to policy analysts' preconceptions which were formed unconsciously and an error in the way the mind processes information (MacCoun 1998, Flyvbjerg 2009).

Thirdly, in the interviews, we found several instances of differences between advocacy and hot bias. For example, according to the first interview results, some professors who thought that there was insufficient construction of railroads were likely to promote a

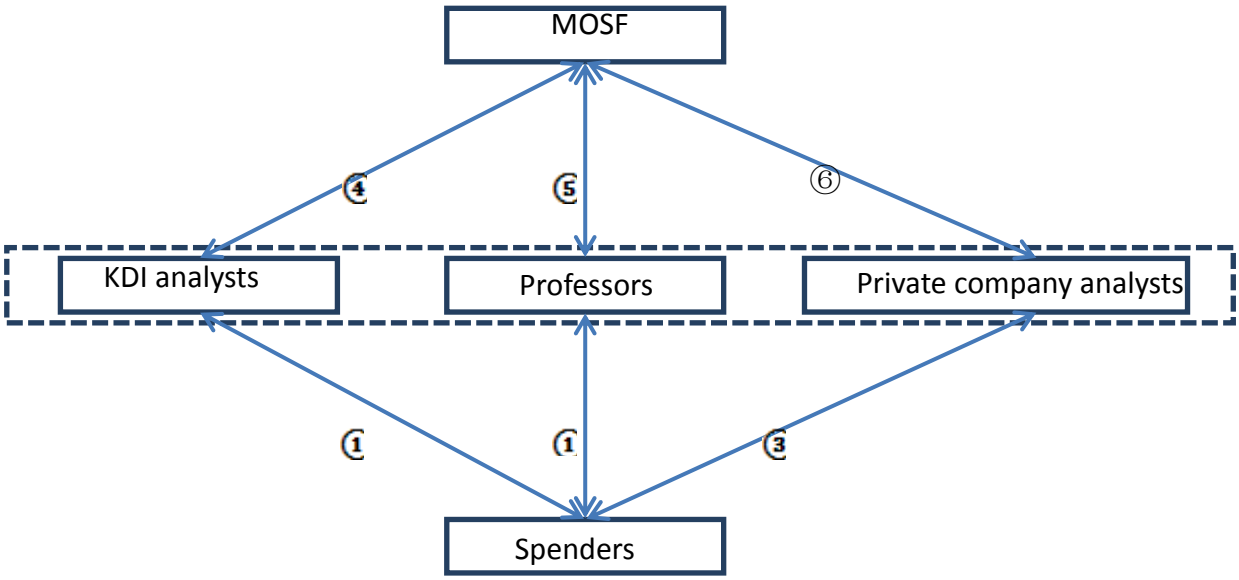
railroad project, whilst other professors who believed that the total cost of a railroad might have been under-estimated at the project planning stage, tended to consider the estimated B/C ratio might be lower than the actual B/C ratio. We categorized issue advocacy as intended non-neutral behaviour arose from policy analysts' values in relation to the projects, and they were conscious of their biased behaviour. Hot bias, on the other hand, we categorized it as unintended non-neutral behaviour arising from preconceptions which were formed through the policy analysts' experience and the analysts were not aware of their tendency when they expressed their views. However, it was not easy to distinguish advocacy from hot bias in the interviews, because hot bias is related to cognitive bias, which is difficult to recognize in others and even in oneself.

Consequently, considering the relevant literature and the case study, advocacy can be distinguished from hot bias analytically.

8.4.2. Appropriateness of the model for exploring the reasons for non-neutral behaviour by stakeholders in the PRP

Drawing on interview results, in this study, we established the reasons for non-neutral behaviour by stakeholders in the PRP through multiple-tier relationships and multiple-principal multiple-agent relationships (see Figure 8-1).

Figure 8-1: Multiple-tier and multiple-principal multiple-agent relationships in the **PRP**



Source: Adapted from the guidelines for the PRP (KDI, 2010)

This thesis has explained the relationships among stakeholders in the PRP process through multiple-tier and multiple-principal multiple-agent models. Many different relationships exist among stakeholders in the PRP, according to stakeholders' goals and their information level. In view of the goal conflict and information level which stakeholders who had experience in the PRP had, we divided the relationships among stakeholders in the PRP into four types: advocacy coalition, the principal-agent model, policy subsystems, and bottom line types, according to the goals and information which the stakeholders had (see Table 8-2).

Table 8-2: An extended principal-agent model: combining goals and information

Goal conflict		Agent's information level	
		Low	High
Principal's information level	High	Type 4: patronage system	Type 3: advocacy coalition ①, ②
	Low	Type 1: bumper sticker politics	Type 2: principal-agent ⑤, ⑥

Goal consensus		Agent's information level	
		Low	High
Principal's information level	High	Type 8: Plato's Republic	Type7: policy subsystems ②, ③
	Low	Type5: theocracy	Type 6: bottom line ④, ⑤

With respect to the appropriateness of this model for exploring the reasons for non-neutral behaviour by stakeholders in the PRP, three questions arise. Firstly, 'Is the multiple-tier and multiple-principal multiple-agent model appropriate for representing the character of the PRP?', secondly, 'Can this model fully explain the reasons for the non-neutral behaviour of stakeholders in the PRP?', and lastly, 'Is there a possibility of collusion between the two lower tiers?' We examine these questions in turn.

Is the multiple-tier and multiple-principal multiple-agent model appropriate for representing the character of the PRP?

With respect to the appropriateness of using multiple-tier and multiple-principal multiple-agent relation models for exploring the reasons for non-neutral behaviour in the PRP, some might question the role of policy analysts as a mid-tier and raise the issue of whether each type of policy analyst can be distinguished from the others as independent actors.

The first thing to consider about the role of policy analysts (KDI analysts, professors and private company analysts) is that the analysts are the agents for the MOSF and the quasi-principals for spenders.

According to Bertelli (2012, pp. 21), a principal is defined as 'someone who wants something to be done but for one reason or another cannot do it himself' and agent is defined as 'someone who performs a service on a principal's behalf'. The agent has been selected for his specialized knowledge (Laffont and Martimort 2009, pp.2). As for the principle-agent relationship, Wateman and Meier (1998, pp. 174) argue that ' the principle-agent relationship is governed by a contract specifying what the agent should do and what the principle must do in return'. From these previous researches on the principal and agent theory, we can extract the conditions for being principal and agent; delegation of task from the principal to agent because principal cannot do it himself', principal select agent and make contract with agent which specifying what the agent should do and what the principal must do in return.

Considering these definitions and the role of policy analysts and MOSF officials, policy analyst have a role as agents to the MOSF officials and MOSF officials have a role as principals to the policy analysts, because the MOSF officials want objective and expert appraisals for decisions on budgets, but they cannot provide these due to their lack of expertise in appraisal methods, while policy analysts can do this due to their expertise on the projects and appraisal methods. MOSF officials select policy analysts who take part in PRP and pay policy analysts for that. Furthermore, according to the PRP guidelines, policy analysts should implement the PRP and report PRP results to MOSF officials (KDI, 2012).

As for the role of policy analysts and spender, policy analysts have a role as quasi-principals to spenders and spenders have a role as quasi-agents to policy analysts, because, they do the role of principal and agent for each other in some degree. Firstly, policy analysts do not role as the original meaning of principal for spender perfectly, because, policy analysts do not delegate all task of PRP to spender, but just only delegate task of making project plan. Furthermore, policy analysts do not make contract with spender for achieving information for PRP. Secondly, however, policy analysts have character as principle for spender in some degree, because, policy analysts need the basic information and project plan for implementing the PRP, but they cannot provide these themselves due to a lack of information about the projects themselves, while spenders can provide these due to their expertise on the projects. Furthermore, even though, there is no contract between policy analysts and spender, spenders should offer project information to policy analysts by PRP guidelines (KDI, 2012) which specify what the spender should do and what the policy agent must do in return.

Furthermore according to Dixit (2002), the intermediate tier can acquire expertise and thereby get some information, which should enable its members to control lower-level agents while giving up less information rent[44] than would be the case with direct supervision by top-level principals. The KDI also argues that the PRP mitigates information asymmetry between the MOSF and line ministries (Kim 2007).

Consequently, considering policy analysts' role as quasi-principals to spenders and agents to MOSF officials and policy analysts are composed of three types; KDI analysts, professor and private company analysts, the relationship among stakeholder in PRP can be defined as mid-tier in the multiple-tier and multiple-principal multiple-agent relationship model.

Secondly, as for the independent role of each type of policy analyst, policy analysts can be divided into three types and they can take part in the PRP process independently. According to the KDI, in order to induce balanced decision-making, PRP teams are composed of members from three or more organizations such as KDI analysts, university professors, and employees of private engineering companies (Kim 2007). Furthermore, even though open review is implemented with other stakeholders, each policy analyst is considered as an independent actor when he or she takes part in the scoring and weighting process (KDI 2008). Thus, each policy analyst can be considered as an independent actor in the PRP process and they can be classified into three types

[44] The Rent an agent derives from having information not provided to the principal.

according to their organizations. For these reasons, we can define the PRP as a multiple-principal multiple-agent model.

Can this model fully explain the reason for non-neutral behaviour by stakeholders in the PRP?

With respect to the appropriateness of the reasons for non-neutral behaviour by stakeholders in the PRP, in this study, we present 'goal conflict' as the main motivating factor and 'information asymmetry' as the main facilitating factors among stakeholders for their non-neutral behaviour.

According to the second interview results, most stakeholders who had taken part in the PRP stated that this reason was appropriate to explain non-neutral behaviour by stakeholders in the PRP (agreed 21, partly agreed 3, did not agree 4).

On the other hand, some interviewees presented the dependence of policy analysts on spenders as the main reason for their non-neutral behaviour, because some private company analysts and professors have close relationships with spenders as the commissioning organization or the builder. However, the multiple-principal multiple-agent model which was adopted in this thesis can explain this dependence of policy analysts on spenders through the diverse relationships that exist among stakeholders, according to the latter's goal conflict (or consensus) and information level. In this study this relationship was explained by the 'policy subsystem' in which spenders share their goals with policy analysts.

Consequently, considering the second round of interview results, multiple-tier and multiple-principal multiple-agent relationship models might be appropriate for fully explaining the reasons for the non-neutral behaviour of stakeholders in the PRP.

The possibility of collusion between the two lower tiers

According to a simple multiple-principal multiple-agent model, if there is general consensus on policy goals between principal and agent, then it should not be necessary to have political control of agents. Consequently, only two types – advocacy coalition and principal-agent – remain in which there is goal conflict between principal and agent and political control of agents is actively contested on a regular basis. Furthermore, it is important to recognize that agents possess more information than their principals in a principal-agent relationship, and thus the most problematical behaviour for political control of agents should be in the Type 2 (principal-agent) relationship (Waterman and Meier 1998).

However, this implication may not apply to some relationships in the multiple-tier model. According to Dixit (2002), it is important to recognize that this raises the possibility of collusion between the two lower tiers in the multiple-tier model if their goals are similar to each other whilst being in conflict with the top-tier's. However, top principals can eliminate this temptation by giving regulators just enough incentive to report truthfully when they get the impression that the lower agent is displaying non-neutral behaviour and is presenting selected information.

We discovered the possibility of collusion between the two lower tiers in the first round of interviews. For example, if private company analysts have similar goals to those of

spenders, they might not be motivated to control spenders' non-neutral behaviour, and there may be collusion between them. However, it may create a moral hazard in the view of MOSF officials, because there is goal conflict between the MOSF and the two lower tiers (private company analysts and spenders).

Consequently, considering the relevant literature and the case study, there is the possibility of collusion between the two lower tiers in the PRP.

8.4.3. Feasible policy alternatives for reducing the non-neutral behaviour of stakeholders

In Chapter 7, in order to generate policy alternatives for reducing non-neutral behaviour by stakeholders, we reviewed the special features of the PRP. Considering these factors and the first interview results, we proposed five policy alternatives: ① PA1: the name of the policy analyst and the weighting he/she used ② PA2: separate the scoring and weighting processes ③ PA3: exclude biased policy analysts from the PRP ④ PA4: monitor policy analysts' behaviour and reflect the results in their performance and personnel management ⑤ PA5: adopt a competitive system for appointing the PRP managing institute. In order to increase the validity of our study, we implemented a second round of interviews on adopting these policy alternatives. Through the second interviews, we found the following two main implications of adopting these policy alternatives.

Rankings for policy adoption differ according to each stakeholder

Through the second interviews, we found that stakeholders differed from each other in their opinions on adopting policy alternatives. As seen from Table 8-3, the rankings for the different policy alternatives, which were produced from all the interviewees' opinions on adopting these policy alternatives, were PA2, PA3, PA4, PA1, and PA5, in that order. From these results, we realized that the policy alternative most favoured by interviewees was PA 2 (separate scoring and weighting processes) and the least favoured policy alternative was PA5 (adopt a competitive system for appointing the PRP managing institute).

Table 8-3: Opinions of stakeholders about adopting policy alternatives and their rankings

All interviewees		Agreed	Partly agreed	Neutral	Did not agree	Total	
							Ranking
PA[45] 1	No of people	11	10	4	7	32	***4***
	Score[46]	***22***	***10***	***0***	***-14***	***18***	
PA 2	No of people	19	7	4	0	30	***1***
	Score	***38***	***7***	***0***	***0***	***45***	
PA 3	No of people	19	7	1	4	31	***2***
	Score	***38***	***7***	***0***	***-8***	***37***	
PA 4	No of people	15	8	3	5	31	***3***
	Score	***30***	***8***	***0***	***-10***	***28***	
PA 5	No of people	6	11	6	8	31	***5***
	Score	***12***	***11***	***0***	***-16***	***7***	

[45] PA1 (Make public the results of weightings set by each policy analyst and their name), PA 2 (Separate scoring and weighting processes), PA3 (Exclude biased policy analysts from the PRP process), PA 4 (Monitor policy analysts' behavior and reflect the result in their performance and personnel management), PA5 (Adopt a competitive system for appointing the PRP managing institute)

[46] Score = number of people × weight (agree: +2, partly agree: +1, neutral: 0, not agree: -2)

As seen in Table 8-4, the rankings for each policy alternative produced by spenders were PA3, PA2 and PA1, PA5, and PA4, in that order. From these results, we realized that spenders agreed with adopting all the policy alternatives, and we also found that the favorite policy alternative of spenders was PA 3 (exclude biased policy analysts from the PRP), and the least favorite policy alternative of all interviewees was PA4 (monitor policy analysts' behaviour and reflect the results in their performance and personnel management). As for the opinion of policy analysts, the interviews showed that the rankings for each policy alternative given by policy analysts were PA2, PA4, PA3, PA1, and PA5, in that order. Furthermore, they did not agree with adopting PA1 (make public the weightings set by each policy analyst and their name), or PA5 (adopt a competitive system for appointing the PRP managing institute). Lastly, when it came to the opinion of MOSF officials and experts, we found that their favourite policy alternatives were PA3, PA2, PA4, and PA1 place in order. Furthermore, they did not agree with adopting PA5 (adopt a competitive system for appointing the PRP managing institute).

Considering these results, we realized that three policy alternatives (PA 2: separate scoring and weighting processes, PA3: exclude biased policy analysts from the PRP, and PA 4: monitor policy analysts' behaviour and reflect the results in their performance and personnel management), which were agreed to by all types of stakeholder, could be adopted with some further work on reducing side effect and activating them, while the other two alternatives (PA1: make public the weightings set by each policy analyst and their name, and PA5: adopt a competitive system for appointing the PRP managing institute), which were not agreed to by some types of stakeholder, needed further debate before they could be adopted as policy alternatives.

Table 8-4: Opinions of stakeholders about adopting policy alternatives and their rankings

Spenders		Agreed	Partly agreed	Neutral	Did not agree	Total	Ranking
PA 1	No of people	8	2	0	0	10	***2***
	Score	***16***	***2***	***0***	***0***	***18***	
PA 2	No of people	8	2	0	0	10	***2***
	Score	***16***	***2***	***0***	***0***	***18***	
PA 3	No of people	9	1	0	0	10	***1***
	Score	***18***	***1***	***0***	***0***	***19***	
PA 4	No of people	6	2	0	2	10	***5***
	Score	***12***	***2***	***0***	***-4***	***10***	
PA 5	No of people	5	5	0	0	10	***4***
	Score	***10***	***5***	***0***	***0***	***15***	
Policy analysts		Agreed	Partly agreed	Neutral	Did not agree	Total	Ranking
PA 1	No of people	1	3	3	4	11	***4***
	Score	***2***	***3***	***0***	***-8***	***-3***	
PA 2	No of people	6	3	2	0	11	***1***
	Score	***12***	***3***	***0***	***0***	***15***	
PA 3	No of people	4	1	1	4	10	***3***
	Score	***8***	***1***	***0***	***-8***	***1***	
PA 4	No of people	5	2	3	1	11	***2***
	Score	10	2	0	-2	10	
PA 5	No of people	1	2	3	4	10	***5***
	Score	***2***	***2***	***0***	***-8***	***-4***	
MOSF/Experts		Agreed	Partly agreed	Neutral	Did not agree	Total	Ranking
PA 1	No of people	2	5	1	3	11	***4***
	Score	***4***	***5***	***0***	***-6***	***3***	
PA 2	No of people	5	2	2	0	9	***2***
	Score	***10***	***2***	***0***	***0***	***12***	
PA 3	No of people	6	5	0	0	11	***1***
	Score	***12***	***5***	***0***	***0***	***17***	
PA 4	No of people	4	4	0	2	10	***3***
	Score	***8***	***4***	***0***	***-4***	***8***	
PA 5	No of people	0	4	3	4	11	***5***
	Score	***0***	***4***	***0***	***-8***	***-4***	

Policy alternatives can be divided into short-term and mid-to-long-term policies

The other point which we picked up through the second round of interviews about adopting policy alternatives was that we could divide these policy alternatives into two categories according to their character: short-term policy alternatives and mid-to-long term policy alternatives. Short-term policy alternatives are those which can be adopted in the short term and need only a simple action to activate them and reduce policy alternatives' side effects. PA1 (make public the weightings set by each policy analyst and their name), PA 2 (separate scoring and weighting processes) and PA3 (exclude biased policy analysts from the PRP process) might be categorized as short-term policy alternatives. They just need some instructions in the PRP guidelines and further discussion to prevent side effects (for PA1, 3); or they just need strict adherence to the current PRP guidelines which already deal with them (for PA 2). On the other hand, PA 4 (monitor policy analysts' behaviour and reflect the result in their performance and personnel management) and PA5 (adopt a competitive system for appointing the PRP managing institute) might be categorized mid-to-long term policy alternatives, because these alternatives need a detailed mechanism to active them and the likely effects cannot be estimated before this detailed mechanism is created.

Strategy for adopting policy alternatives according to the above two implications

Considering the two implications which were explored in the previous section, we can devise a strategy for adopting policy alternatives according to their acceptance among stakeholders and the time taken for adoption (see Table 8-5).

As Type 1 policy alternatives are acceptable to all types of stakeholder and can be activated in the short term, PA2 and 3 policy alternatives can be adopted in the short

term with little extra preparation. On the other hand, as Type 3 policy alternatives are acceptable only to some types of stakeholder, and not to others, although it can be activated in the short term, the PA1 policy alternative can be adopted only after further discussion about adoption and after devising a mechanism to prevent the side effects which were mentioned by policy analysts. Lastly, as Type 4 policy alternatives are acceptable only to some types of stakeholder and not to others, although they can be adopted in the mid-to-long-term, PA4 and 5 can be only be adopted after a detailed mechanism for activating and further debating them has been devised.

Table 8-5: Strategy for adopting policy alternatives

		Time for adoption	
		Short term	**Mid and long-term**
Degree of agreement on adoptability[47]	**All agree**	**Type 1** PA 2 (separate scoring and weighting processes) PA3 (exclude biased policy analysts from the PRP)	**Type 2**
	Some agree, some not	**Type 3** PA1 (make public the results of weightings set of each policy analyst and their name	**Type 4** PA 4 (monitor policy analysts' behaviour and reflect the result in their performance and personnel management) PA5 (adopt a competitive system for PRP appointing the managing institute)

[47] The degree to which they agree is related to the level of each type of stakeholder (policy analysts, spenders and MOSF/experts).

8.5. Validating the data, findings and interpretations

This section discusses the quality of the data, the results and their interpretation. In terms of validating the data and findings, the study focuses on the internal and external validity and the reliability of these.

8.5.1. Quantitative analysis

Internal and external validity

Validity refers to the soundness and suitability of a methodology (Graziano and Raulin 1998).

Although, according to (Cook, Campbell et al. (1979), p.37) and Dooley (2001, p.268), the validity of social research can be examined under four categories – 'the statistical conclusion validity, the internal validity, the construct validity and the external validity' – it is important to recognize that internal validity includes statistical conclusion validity and external validity includes construct validity. Thus, this study will focus on internal *validity, which is related to the exactness of the causality between the two variables,* and external validity, *which represents the possibility of generalization from a particular result to other persons, settings, and times (Cook, Campbell et al. 1979).*

With respect to internal validity, in order to verify the causal relationship between the two variables, variable X (independent) and variable Y (dependent), the design should have three conditions, as follows (Johnson and Christensen 2008): ① both variables must be related (the relation condition), ② the cause (variable X) must come before the

effect (variable Y) (the temporal antecedence condition), and ③ there is no possible optional explanation for the relationship between the two variables (non-spurious relation condition).

In the design of the analysis for the Research Question 1, two conditions of internal validity can be satisfied. Firstly, the relationship condition can be established easily by correlational analyses which use the numerical data derived from the secondary data. Secondly, cause (PRP results) comes before effects (BS, BP decisions) in this analysis, because, the PRP (variable X) is implemented before BS and BP decisions are made (variable Y), according to the guidelines. Moreover, as all the F ratios were statistically significant at the level of 0.01, the regression model for this study was satisfactory in terms of goodness-of-fit. Thus the interpretations of the results mentioned above can be said to be valid.

However, this analysis might be vulnerable when it comes to the third condition for internal validity. For example, it might not fully consider extraneous variables that may affect the budgetary decisions, such as major government projects and relationship with other projects. Consequently, it might be said that consideration of more extraneous variables in the regression model is necessary in order to improve the internal validity of this study. However, these data were not available at the time of the study, because the ministry did not have the information about ‘relationship with other projects’ and the definition of major government projects was not defined exactly. Adding these variables as control variables needs to be considered in further research.

As for external validity, the most common threat to external validity is the use of unrepresentative samples. In this study, all the data for Research Questions 1-① and 1-② was drawn from 450 projects which were all the projects subjected to the PRP between 1999 and 2010, according to the character of each question. Furthermore, a consistent policy trend towards the PRP and budgetary decisions continues to be followed by the Korean government. Thus, the findings and interpretations for Research Question 1 can be applied to other projects at different times. For example, the results of the study could well be applied to the PRP of other large-scale public finance projects (e.g. education and welfare projects) which were subjected to the PRP after 2010.

As a result, it can be said that the data, findings and interpretations of analysis for Research Question 1 have a relatively high internal and external validity.

With respect to the validity of the data in the analysis for Research Question 2, Research Question 2-① and 2-③ were analysed through quantitative analysis. It is important to recognize that this quantitative analysis incorporated mathematical equation defined in regulations expressing the relationship between the AHP score and its sub-appraisal factors. The study analyzed the effect on RBS decisions of changing the scoring or weighting methodology. Thus, it might be said that the validity of the data, findings and interpretations of the quantitative analysis is very high.

Reliability of data

According to Creswell and Clark (2007), quantitative reliability means that other researchers can get consistent and stable results through using the same data. There

should be no difference between researchers when they conduct analysis using the present data, because, this study uses the PRP results and budget allocations from 2003 to 2012 which were published by the government and the KDI. Therefore, the analysis for Research Question 1 was based on reliable data and findings. With respect to the validity of the quantitative analysis for Research Question 2, as this study used the PRP results and approved budgets from 2006 to 2010 which were published by the government and the KDI, there should be no difference between the results of researchers when they conduct analysis using this data. Thus, the analysis for Research Question 2 established the reliability of the data and findings.

8.5.2. Qualitative analysis

Validity

Creswell and Clark (2007) present several ways to check for qualitative validity: checking with colleagues, asking for the opinion of others, and triangulation of the data.

Firstly, we sent the main findings of our study, including the theoretical framework and the case study results, to Korean colleagues who had expertise on this topic and asked them whether the findings answered the research question accurately and whether the theoretical framework was logical. Most experts gave positive feedback and were interested in the findings. Some experts also gave the researcher useful advice for the study.

Secondly, the theoretical framework and main case study findings were checked by the researcher's PhD colleagues and supervisors. The first interview results were examined by PhD colleagues through the INLOGOV Doctoral Showcases in early March 2013, and 13 supervisor meetings took place from setting up the interview plan to discussing the results of the interviews. Checking of the findings of the second interviews was done in several supervisor meetings.

Thirdly, this study was implemented by drawing on several sources, and not only using many participants, but also merging qualitative and quantitative analysis results. The study was done by employing multiple sources, such as documentation, archival records, and data from first and second interviews, as well as merging the related findings from the qualitative and quantitative analysis results.

Consequently, it might be said that the validity of the data, findings and interpretation of the qualitative analysis for this research is very high.

Reliability of data

The coding of qualitative analysis was done by the researcher, thus the reliability issue does not arise in this aspect of the research.

8.6. Contributions to knowledge and policy-making

8.6.1. Contributions to knowledge

Contribution to knowledge about the effect of policy information on decision-making in a Korean context

The findings of the analysis for Research Question 1 (What is the impact of PRP results on BS and BP decisions (controlling for other factors)?) have contributed to the literature by proving the impact of PRP results on budget allocations for large-scale projects. Firstly, contrary to previous research, which argues that policy information may be used as a passive and supportive indicator for decision-making (Weiss 1980, Lindblom 1986, Dunn 1997, Kirp 2004), this research has found that policy information can play an important role in decision-making through proving that RBS decisions have had a positive effect on BS decisions and AHP scores have also had a positive effect on BP decisions. Secondly, although Ko (2007) argues that RBS decisions might have an important effect on budgetary decisions through having carried out a simple review of PRP results and budget decision results for projects which were subjected to the PRP between 1999 and 2003, he did not prove his findings through a statistical approach and he did not consider the effect of control variables. This study has contributed to the literature by proving the positive impact of PRP results on budget allocation, and the impact of control variables as well, through a statistic approach.

Contribution to knowledge about the appropriate scale and weighting methodology in a Korean context

Firstly, the findings of the analysis for Research Question 2-② (What are the views of stakeholders in the PRP process on whether the current PRP methodology leads to appropriate RBS - and what are the reasons for these views?) have contributed to the literature by exploring the opinions of stakeholders on the appropriateness of the current nine-point-scale methodology, especially its discretization of ratio scale. Although previous research debates have been about whether the nine-point scale can capture the human perception through its empirical analysis (i.e. correlation analysis), in this study, we realized that the opinion of each stakeholder on the appropriateness of the current nine-point-scale methodology might be different, according to the type of stakeholder. According to the interview results, policy analysts supported the current nine-point-scale methodology, because discretization of ratio scale increases the possibility of distinguishing among projects which gather around B/C =1, while many spenders were concerned about the nine-point scale because, as the B/C ratio cannot be estimated exactly, this might be a problem when the nine-point scale enlarged the effect of the B/C ratio on the AHP score.

With respect to the previous research approach, at the beginning of this study, we tried this analysis as a preliminary analysis through comparing the effect of the B/C ratio on the economic priority using the nine-point scale and the balanced scale with correlation analysis. From the results we realized that the effect could be estimated by the equation which defined the relationship between the B/C ratio and economic priorities without implementing empirical analysis. For this reason, we tried to judge the appropriateness

of the nine-point-scale methodology through interviews with stakeholders who took part in the PRP.

Secondly, the findings of the analysis for Research Question 2- ① (What is the effect of current PRP methodology on RBS decisions?) have contributed to the literature not only by confirming the argument of Jacob and Goddard (2007) about the sensitivity of composite indicators to aggregation methods, but also by extending the argument to identify certain directions of sensitivity. According to the findings of the analysis for Research Question 2-①, the RBS decisions of ten per cent of projects (17/165) can be changed by changing the weighting set for appraisal sub-factors. Furthermore, 16 projects out of 17 had their RBS decisions changed from 'recommended' to 'not-recommended' when their weighting was changed to a fixed one. Hence we have found that RBS decisions are not robust to changing weightings and measurement scale.

Contribution to knowledge about the non-neutral behaviour of policy analysts in a Korean context

The findings of the analysis for Research Question 3-① (What are the types of, and extent of, non-neutral behaviour by each stakeholder that occur in the PRP?) have contributed to the literature by proving the existence of stakeholders' non-neutral behaviour in terms not only of over-stating but also of under-stating AHP scores.

Although previous research has argued that there policy analysts may exist who are affected by their value chains (Meltsner 1976) and have a biased interpretation of

scientific evidence (MacCoun 1998), there are few discussions of the direction of their biased views and behaviour. Although previous researchers have argued for the existence of one direction of tendency (over-stating benefits and under-stating costs) among stakeholders in the CBA (Flyvbjerg 2009), they have not referred to the existence of another direction of tendency (over-stating costs and under-stating benefits). In this study, drawing on the interview results, we found that there were not only non-neutral behaviours that over-estimated the AHP scores of projects but also those that under-estimated them.

Contribution to knowledge about the reasons for non-neutral behaviour by stakeholders in a Korean context

The findings of the analysis for Research Question 3- ② (What are the reasons for the observed non-neutral behaviour of stakeholders in the PRP?) have contributed to the literature as follows.

Firstly, drawing on the interviews, we found that relationships among stakeholders in the PRP might be defined as multiple-tier or multiple-principal multiple-agent, as argued by Dixit (2002) and Ross (1973).

Secondly, the findings of the analysis for Research Question 3-② proved that there were many different relationships among stakeholders in the PRP. According to interview result, as agents had more information than, or an equal amount of information to, principals in the PRP, we realized that the relationships among stakeholders in the process might be classified into four types – advocacy coalition,

principal-agent, policy subsystem, and bottom line – out of the eight types of the Waterman (1998) model, according to whether goal conflict or information asymmetry was present. Furthermore the findings of the analysis for Research Question 3-② also proved that the different models coexisted in a more generalizable model of the bureaucratic process. According to the interview results, each stakeholder can be classified into overlapping models, according to whether there is goal conflict or information asymmetry between principals and agents.

Lastly, the findings of the analysis for Research Question 3-② proved that the implications of the Waterman model (1998) for political control of the bureaucracy might be different in multiple-tier and principal-agent models. According to Waterman (1998), there are only two types of relationship (Types 2: principal-agent, and 3: advocacy coalition) in which political control of the bureaucracy should be actively contested on a regular basis, because political control of the bureaucracy should be facilitated when goal consensus is high (Types 5: theocracy, 6: bottom line, 7: policy subsystems, and 8: Plato's Republic), and when bureaucratic discretion is limited (Types 1: bumper sticker politics, 4: patronage system, 5: theocracy, and 8: Plato's Republic), or when principals possess greater information than their agents (Types 4 and 8).

However, these implications for policy might be different if we consider multi-tier relationships, because those belonging to an intermediate tier whose goals are different from the goals of the top tier are likely to collude with the lower tier out of concern for their 'post-career' or for bribes (Dixit, 2002). The findings of the analysis for Research

Question 3-② proved the implications of Dixit (2002) through proving that the intermediate tier in the PRP, such as private company analysts and some professors, might collude with spenders because they expected to participate in the projects or enlarge their influence in their own sphere. For these reasons, in Type 7 relationships (policy subsystems) and Type 6 (bottom line), political control of the bureaucracy might be actively contested in terms of the activities of top level principals in the PRP.

8.6.2. Contribution to policy making

Potential definition for 'Preliminary Feasibility Study'

We proposed a potential definition for 'Preliminary Feasibility Study' to policy makers. According to the KDI (2012), the Korean Preliminary Feasibility Study can be defined as 'an overview survey preceding a detailed feasibility study which is aimed at budget planning and priority setting'.

However, as seen from Chapter 3, this definition raises two issues, as follows. The first issue is about the meaning of feasibility. As the sub-appraisal factors for making PFS results are composed of economic factors (efficiency related to desirability), balanced regional development factors (equity related to desirability) and policy factors (financial and environmental feasibility), the meaning of 'feasibility' in this study is different from the narrow sense of feasibility which means 'possibility of implementation'. The second issue is about the role of the PRP. The phrase 'overview survey' in the definition of PFS cannot reflect the role of PFS as policy recommendation which is actionable, prospective and value laden.

Considering these two issues and the characteristics of the Korean PFS, we proposed 'Preliminary Project Recommendation Process whereby the KDI selects candidates for budget approval by the MOSF' as the potential definition for the Korean 'Preliminary Feasibility Study'.

Alternatives for the current PRP methodology

Firstly, we proposed some alternatives for the current PRP methodology to policy makers. According to the findings, Type 3 (balanced scale system + same weighting for projects within the same project type), Type 1 (balanced scale methodology + different weightings for each project), and Type 2 (nine-point scale methodology + same weighting for projects according to their type) can be proposed as potential alternatives for the current PRP.

Secondly, we also proposed that policy makers should consider the side effects of each alternative to PRP methodology which was raised by stakeholders. As for scale methodology, if policy-makers want to maintain the current nine-point scale methodology, they have to increase the exactness of the B/C ratio and create properly separated points along the scale. On the other hand, if policy makers want to adopt balanced scale methodology, they have to create a method to make it possible to distinguish more clearly among the projects which gather around B/C ratio = 1. With respect to the weighting methodology, if policy makers want to maintain the current weighting methodology, they have to create a method of reducing the non-neutral behaviour of each kind of stakeholder. On the other hand, if policy makers want to

adopt a new weighting methodology in which policy analysts give different weightings to each project type, while giving the same weighting to projects which are of the same type, they have to consider how to classify the type of projects and how great to make the difference between the weightings set for the different types.

Alternatives for reducing non-neutral behaviour by stakeholders

Firstly, the study suggests that all the stakeholders, especially those from the MOSF and KDI who manage the PRP and design it, should be cautious about designing and managing the PRP, considering these four types of non-neutral behaviour of stakeholders and their effect.

Secondly, the study suggests five policy alternatives for reducing non-neutral behaviour: ① make public the weightings set by each policy analyst and the analyst's name ② separate the scoring and weighting processes ③exclude biased policy analysts from the PRP ④monitor policy analysts' behaviour and reflect the result in their performance and personnel management ⑤ adopt a competitive system for appointing the PRP managing institute.

Lastly, the study also suggests a policy alternative for reducing the non-neutral behaviour of stakeholders according to the time taken for adoption and the agreement of stakeholders to that adoption. Policy alternatives which are agreed by all types of stakeholder and which can be activated in the short term can be adopted with little extra preparation. On the other hand, policy alternatives which are agreed to by some types of stakeholder but not by others, while it may be possible to activate them in the short term,

can only be adopted after further discussion and creating mechanisms to prevent the side effects which were raised by policy analysts. Lastly, policy alternatives which are agreed to by some types of stakeholder but not by the others, while it may be possible to adopt them in the mid and long term, can only be adopted after creating detailed mechanisms for activating and further debating them.

8.7. Conclusion

This chapter has interpreted and discussed several issues which were raised by the findings from the analysis for research questions.

The first section interpreted the factors which affect the BS and BP of budget decision makers. They implied that not only has the current PRP accomplished its aims, but also that MOSF officials considered the AHP score as a good indicator for deciding the annual budget allocation on large-scale projects.

The second section interpreted the impact of current PRP methodology on RBS decisions, and the opinions of stakeholders on the current PRP methodology. The interview results implied that scale and weighting methodology played an important role in the recommendations made about decisions. Furthermore they implied that policy analysts had a generous tendency when they took part in the PRP. With respect to the appropriateness of current PRP methodology, they implied that opinions on its appropriateness might be different according to the different types of stakeholder.

The third section interpreted and discussed the results of interviews concerning non-neutral behaviour by stakeholders. With respect to the appropriateness of the four types of non-neutral behaviour of stakeholders in the PRP, we discussed the appropriateness of the model through an examination of the existence of tendency toward under–estimating the AHP score and the difference between advocacy and hot bias. On the other hand, concerning the appropriateness of the model for exploring the reasons for non-neutral behaviour by stakeholders in PRP, we discussed the appropriateness of the model through an examination of the role of, and relationships among, stakeholders, as they were regulated by the guidelines, and the views of this issue produced by the second round of interviews. With respect to feasible policy alternatives for reducing the non-neutral behaviour of stakeholders, we discussed the appropriateness of, and the strategy for adopting these policy alternatives through a review of the second interviews about this issue.

The fourth section evaluated the validity and reliability of the data, findings and interpretations of both the qualitative and quantitative approaches, and concluded that these approaches had high validity and reliability.

Finally, the chapter indicated that the present study makes several contributions to the knowledge and work of policy makers.

CHAPTER 9 CONCLUSION

9.1. Introduction

In 1999, the Korean Government adopted the PRP in order to enhance fiscal efficiency by preventing 'not-recommended' projects from receiving positive BS decisions. However, there has been no previous empirical research on the effect of the PRP on budgetary decisions in South Korea. Furthermore, there are several debates on the use of the current PRP methodology, the value of PRP results and the possibility of non-neutral behaviour by stakeholders who take part in the PRP.

Thus, this study was intended to contribute to improving government budgeting and policy decisions by suggesting alterations to, or an alternative methodology for, the PRP. And the researcher has been able to suggest ways of preventing or containing the non-neutral behaviour of stakeholders in the PRP. Moreover, the study has made a theoretical contribution through its demonstration of the extent to which policy information (specifically, PRP results) has a direct impact on government decision-making and budgetary allocations, and its development of a methodology for testing the existence of non-neutral behaviours by different stakeholders in the PRP.

In order to make these contributions, this study developed the three main research questions and approached them through both quantitative and qualitative analysis, using various kinds of research methods.

This chapter summarizes the main answers to the research questions, and then considers the study's limitations as well as further possible research areas.

9.2. Answers to the Research Questions

This study dealt with the following four research questions (one preliminary research question and three main research questions) through both quantitative and qualitative analysis: How does the PRP and related budget process operate? (preliminary research question) What is the impact of PRP results on BS and BP decisions (controlling for other factors)? Does the current PRP methodology lead to inappropriate decisions from the perspective of different stakeholders in the set of projects which are recommended for selection? What are the types of, extent of, and reasons for non-neutral behaviour by stakeholders in the PRP and how might this behaviour be reduced?

The preliminary research question and second research question involved both quantitative and qualitative analysis. The first research question involved quantitative analysis, while the fourth research question involved qualitative analysis. The answers to the research questions examined in Chapters 3, 5, 6, and 7 are presented below.

9.2.1. Answer to the preliminary research question

The preliminary research question was: How do the PRP and related budget process operate? This preliminary research question was asked in order to assess current methodology and raise issues which would be relevant to the main research questions.

The research questions were to be addressed by documentary research and interviews. With respect to the first research sub-question (What are the requirements for BS and

BP decisions in the law and regulations? And do the current systems actually follow the laws and regulations to the letter?), documentary research showed that RBS is an essential requirement for BS decisions, while AHP scores are not an essential requirement for BP decisions, according to the PRP guidelines and related law and regulations. However, according to interview results and archive data, we found that some 'not-recommended' projects received a positive BS decision, which went against the guidelines. Furthermore, we also found that the AHP score might affect the BP decision, which was not mentioned in the guidelines. These findings implied that the budget system did not actually follow the related the laws and regulations to the letter.

With respect to the second sub-question (How do the scoring and weighting methodologies work, in combination with other practices and factors, to determine PRP results in accordance with the law and regulations? And do these methodologies actually follow the laws and regulations to the letter?), documentary research showed that scoring and weighting methodologies were separate from each other, and policy analysts had discretionary power to set them, within the range permitted by the PRP guidelines. However, through the first round of interview results, we found that policy analysts undertook scoring and weighting at the same time, which went against the guidelines' expectation that these processes would be carried out separately. Furthermore we also found that policy analysts differed from each other in their standards for judging weighting on sub-appraisal factors, and that they used their discretionary power within the range permitted by the guidelines.

From these results, we developed questions about the effect of this discretionary power of policy analysts on RBS decisions and on how policy analysts behaved when they took part in the PRP. The details of these questions were analyzed in Chapters 6 and 7.

9.2.2. Answer to Research Question 1

The first research question was: What is the impact of PRP results on BS and BP decisions (controlling for other factors)? This is about the relationship between the results of PRP (AHP score, RBS) and budgetary decisions (BS, BP).

In order to address the first research question through quantitative analysis, this study firstly defined and operationalized the dependent variables (BS, BP), the independent variables (AHP score, RBS) and the control variables through the relevant literature and the analysis for the preliminary research question.

Regression analysis showed firstly that RBS (recommendation for budget selection) had a statistically significant relationship with the BS (budget selection decision) at the 1% confidence level, and the effective direction was positive, while SHARE (whether or not the total project cost is shared between central government and others) had a statistically significant relationship with the BS (budget selection decision) at the 1% confidence level, and the effective direction was positive. These findings provided useful insights. The former finding implied that the current PRP had accomplished its aim of enhancing fiscal productivity by promoting large-scale projects based on transparent and objective ex ante project evaluations. The latter finding indicated that projects which were funded

not only by central government but also by other stakeholders, including local government, got budget approval more easily than other projects did.

Secondly, regression also showed that the AHP score had a statistically significant relationship with the BP (budget pace decision) for the mid and long-term year, at the 1% confidence level , and the effective direction was positive. Regarding the relationship between the control variables and BP, SIZE (project size in the context of central government expenditure) and SHARE had statistically significant relationships with the BP for the mid and long-term years, at the 5% confidence level , and the effective directions are negative and positive respectively, while CAPITAL(capital area project or not) had a statistically significant relationships with the BP only for the mid term, at the 5% confidence level, the effective direction was positive. The former finding implied that MOSF officials consider the AHP score as a good indicator for deciding the annual budget allocation on large-scale projects, even though there are no guidelines which recommended them to do so.

Regarding the findings about the relationship between BP and control variables, as SHARE and SIZE were related to central government budget expenditure, these findings implied that projects which were funded not only by central government but also by other stakeholders, including local government, were constructed more quickly through receiving a budget allocation more swiftly than other projects did. Furthermore, they also implied that projects of which budget size small were constructed more quickly through receiving a budget allocation more swiftly than large sized projects did.

Moreover, as CAPITAL was correlated to the degree to which a project was related to another project, and to population density, these results implied that a project which is related to another project and in an area with a high population is likely to be constructed more quickly through receiving a budget allocation more swiftly than projects in other areas.

9.2.3. Answer to Research Question 2

The second research question was: Does the current PRP methodology lead to inappropriate decisions, from the perspective of different stakeholders, on the set of projects which are recommended for selection?' This is about the appropriateness of using current PRP methodology and is divided into four research sub-questions.

In order to address the second research question, both quantitative and qualitative analysis were employed.

With respect to the first research sub-question (What are the effects of the current PRP methodology on RBS decisions?), the quantitative analysis showed firstly that maximum seven per cent of projects' RBS decisions were changed by changing the nine-point scale into a balanced scale. Furthermore, it is important to realize that there is asymmetry in the number of projects for which RBS decisions were changed from 'recommended' to 'not-recommended' and vice versa. This finding implied that the nine-point scale might be a better method for ensuring that inefficient projects (B/C ratio <1.0) are not recommended in the PRP than the balanced scale is.

Secondly, as concerned the impact of the current weighting methodology on RBS decisions, about 10 per cent of projects' RBS decisions (AHP≥0.5) were changed by changing the current discretionary weighting system into a fixed one. Furthermore, it is important to recognize that there is asymmetry in the number of projects for which RBS decisions were changed from 'recommended' to 'not-recommended', and vice versa. In 16 out of 17 projects the RBS decision was changed from 'recommended' to 'not-recommended' when the weightings set for the appraisal sub-factors were changed into one fixed weighting. This finding implied that policy analysts had a generous tendency when they made RBS decisions through their discretionary power over the weightings set for appraisal sub-factors.

With respect to the second sub-question (What are the views of stakeholders in the PRP on whether the current PRP methodology leads to appropriate RBS – and what are the reasons for these views?), interview results showed, firstly, that most policy analysts were not concerned about the current nine-point scale methodology. However, most other stakeholders were concerned about the current nine-point scale system. Let us look firstly at the reasons for this. Concerns about the current nine-point scale can be divided roughly into three: enlargement of the effect of some specific ranges of the B/C ratio; inaccuracy of the B/C ratio; and too great a difference between the points on the scale. On the other hand, the reasons for having a positive attitude to the current nine-point scale can be divided roughly into two: the increase in the possibility of distinguishing between the B/C ratios of projects which gather around B/C = 1; and the increase in the impact of the B/C ratio, which is produced objectively, on AHP scores. Furthermore, according to the interview results, the current nine-point scale system

could not be supported by all stakeholders who had taken part in the PRP, because opinions about using the nine-point scale as current PRP methodology might differ according to stakeholders. Consequently, these findings implied that the current nine-point scale could be justified if the weak points raised by some stakeholders (i.e. the differences between the scale points and the accuracy of the B/C ratio) were reduced.

Secondly, most spenders opposed the current weighting methodology and most policy analysts supported it. Also, it could be taken that most experts and MOSF officials supported the current methodology. Let us look at the reasons for this. The main reason for supporting the current weighting methodology is that policy analysts can reflect their own judgement of a project by manipulating the weightings set for appraisal sub-factors. On the other hand, the main reason for opposing the current weighting methodology is that the current methodology gives too much discretion to analysts. Furthermore, according to the interview results, the current weighting methodology could not be supported by all stakeholders who had taken part in the PRP, because opinions about using the current weighting methodology as current PRP methodology might differ according to stakeholders. These findings imply that reducing policy analysts' discretion on setting weightings might be one possible alternative to the current weighting methodology. Otherwise, the current weighting methodology, which allows policy analysts discretion on setting weightings, might be justified if it could be used transparently and objectively.

With respect to the third sub-question – What would be the effect of possible alternative PRP methodologies on RBS decisions? – quantitative analysis showed firstly that each type of alternative methodology had a different effect on RBS decisions. An RBS

decision might be decided by the joint effect of an alternative scale and weighting methodology. The balanced scale methodology might better enable projects which had a relatively low B/C ratio to be successful in the PRP than the nine-point scale does. On the other hand, having the same weighting methodology might help prevent policy analysts from being too generous towards projects which have a higher score on policy factor than other projects. Secondly, according to the results of the analysis, a maximum of 16 projects' RBS decisions were changed from 'recommended' to 'not-recommended' by changing the PRP methodology. We found that these projects' mean policy scores were higher than those of the projects as a whole, and that the means of their B/C ratio and regional scores were lower than those of the projects as a whole. Thirdly, a maximum of nine projects' decisions were changed from 'not-recommended' to 'recommended' by changing the PRP methodology. We found that these projects' mean regional scores were higher than those of the projects as a whole, and the means of the B/C ratio and policy score were lower than those of the projects as a whole.

With respect to the fourth sub-question (How desirable do different stakeholders think these alternative PRP methodologies would be?), the second interview results showed that stakeholders' favourite possible alternatives for PRP methodology were Type 3 (balanced scale methodology + same weighting for projects within the same project type), Type 1 (balanced scale methodology + different weightings for each project), and Type 2 (nine-point scale methodology + same weighting for projects according to their type), in that order. These findings implied that Type 3 could be the leading candidate for a policy alternative to the current PRP methodology. However, from the responses to the first and second rounds of interviews, we realized that in order to adopt this

policy alternative, further study of the how the projects should be grouped and how much difference in their weightings would be appropriate should be discussed first.

9.2.4. Answer to Research Question 3

The third research question was: What are the types of, the extent of, and the reasons for, non-neutral behaviour by stakeholders in the PRP and how might this be reduced? In order to address the third research question, qualitative analysis was employed.

With respect to the types of and extent of non-neutral behaviour by stakeholders in the PRP, this study identified seven possible meaningful non-neutral behaviours through its review of the relevant literature, and categorized these into four types, according to their intentionality and the direction of their tendency: Promoter behaviour (Type 1: client advocacy, issue advocacy, showing their projects at their best at the PRP stage, and affected by political pressure) can be characterized as intended non-neutral behaviour with a tendency towards over-stating the AHP score of projects. Blocker behaviour (Type 2: issue advocacy) can be characterized as intended non-neutral behaviour with a tendency towards under-stating the AHP score of a project. Dr Pangloss behaviour (Type 3: hot bias and constituency-support analysis) can be characterized as unintended non-neutral behaviour with a tendency towards over-stating the AHP score of projects; and Cassandra behaviour (Type 4: hot bias and regarding the PRP as naïve) can be characterized as unintended non-neutral behaviour with a tendency towards under-stating AHP score of projects. The results of the case study suggested the existence of

tendency toward under-stating the AHP score, even though previous researchers did not refer directly to the existence of this. They also suggested that, as this non-neutral behaviour was not foreseen in the aims of the PRP, the MOSF and KDI, who manage the PRP and design it, should be cautious about all these four types of non-neutral behaviour by stakeholders, and the effect of them, when they design and manage the PRP.

With respect to the reasons for non-neutral behaviour by stakeholders in the PRP, we established the multi-tier and multiple-principal multiple-agent relationship models, which reflected the relationships among the stakeholders in the PRP and extracted goal conflicts and information asymmetry as the reasons for non-neutral behaviour by stakeholders in the PRP. This case study showed firstly that the relationships among stakeholders in the PRP could be explained through multiple-tier and multiple-principal multiple-agent models. Many different relationships existed among stakeholders in the PRP, according to their goals and their information levels. According to the goal conflicts and differences in information level which stakeholders had, the relationships among them in the PRP were divided into four types: advocacy coalition, principal-agent model, policy subsystem, and bottom line type. This result implied that the non-neutral behaviour of stakeholders could be explained through these relationships and the policy alternatives for reducing non-neutral behaviour could be derived from these relationships. Secondly, this case study also implied the possibility of collusion between the two lower tiers in the multiple-tier model (e.g. between private company analysts and spenders). This is in line with Dixit (2002), who raised the possibility of collusion between the two lower tiers in the multiple-tier model.

With respect to the policy alternatives for reducing the non-neutral behaviour of stakeholders in the PRP, this study employed documentary analysis and the first interviews in order to derive potential policy alternatives; and it employed the supplementary interviews for creating strategies for getting these policy alternatives adopted. We devised five potential policy alternatives which reflected the specific factors which were revealed by the documentary analysis and the first interviews, such as ① make public the weightings set by each policy analyst and their name ② separate the scoring and weighting processes ③ exclude biased policy analysts from the PRP ④ monitor policy analysts' behaviour and reflect the result in their performance and personnel management ⑤ adopt a competitive system for appointing the PRP managing institute. Through the second round interviews, we realized that different types of stakeholder might favor different policy alternatives, and have different reasons for supporting or opposing each policy alternative. Considering these interview results, we suggested strategies for adopting policy alternatives for reducing non-neutral behaviour, according to time for the adoption of these and the degree of agreement on adoptability among stakeholders. For example, policy alternatives which all types of stakeholder agree to adopt and which can be activated in the short term might be adopted in the short term with little extra preparation (e.g. ② separate scoring and weighting processes, and ③ excluding biased policy analysts from the PRP). On the other hand, policy alternatives the adoption of which is the subject of conflict among the different types of stakeholder, while it may be possible to activate them in the short term, can be adopted only after further discussion about adopting them and devising ways of ruling out the side effects which were raised by policy analysts (i.e. ① make public the weightings set

by each policy analysts and their name). Lastly, policy alternatives the adoption of which is the subject of conflict among the different types of stakeholder, while it may be possible to adopt them in the mid and long–term, can be adopted only after a detailed mechanism has been created for activating and further debating them (e.g. ④ monitoring policy analysts' behaviour and reflecting the results in their performance and personnel management ⑤ having a competitive system for selecting the PRP managing institute).

9.3. Future research areas

The present research has been successful in exploring and explaining the impact of the Korean PRP on budgetary decisions through answers related to the four research questions, employing both quantitative and qualitative approaches.

However, further research with similar research topics in other policy areas might enrich the findings of this study. For example, as each country has different appraisal systems, a cross-national comparison would enable researchers to find out the different effects of appraisal systems on budgetary decisions and the different types of non-neutral behaviour of stakeholders in the public sector.

Secondly, further research is needed to increase the internal validity of analysis for Research Question 1 by considering additional extraneous variables. This study may not fully consider extraneous variables that might affect the budgetary decisions, such as

projects being major government projects and having relationships with other projects, because the relevant data were not available at the time of study. Consequently, in further study, if possible, these factors should be considered to increase the internal validity of the analysis.

Thirdly, further research needs to analyze the data on the actual weighting results of each policy analyst on each project. As the behaviour of policy analysts is revealed through the weighting process and their results, we can explore the behaviour of each policy analyst through analysis of these data. Furthermore, the results might provide a good comparison with the findings of this study, which were explored through interviews with stakeholders who had taken part in the PRP. However, as the KDI had not made public the information on each policy analyst′s weightings on each project at the time of the study, these data could not be considered here. Consequently, in further study, if possible, these factors should be considered to explore the existence and extent of non-neutral behaviour by stakeholders through the quantitative approach.

Lastly, further research is needed to prepare a detailed mechanism for activating the policy alternatives which were suggested in this study, for improving the current PRP methodology, and for reducing the non-neutral behaviour of stakeholders in the process. Although, this study suggested these policy alternatives and their strong and weak points, drawing on the documentary analysis and the first and second rounds of interviews, it could not present a detailed mechanism for activating the policy alternatives at the time of the study, because the adoption of some policy alternatives was a matter of debate among stakeholders, and creating a detailed mechanism for

policy alternatives needs time for in-depth study. Consequently, in any further study, if possible, an in-depth study for the adoption of policy alternatives should be conducted, considering their strong and weak points, and the strategy for adopting them which was suggested in this study.

Appendix

Appendix 1: List of interviewees

1-1. List of interviewees from spenders

1. A general manager from the Korean Rail Network Authority (KRNA)
1) Role: an agency general manager who had been involved in the PFS as a spender
2) Time & Place: 9:00-10:00, 13th December 2012, a meeting room in the Korean Rail Network Authority Building; 19th November 2013 (written reply)

2. A general manager from the Korean Rail Network Authority (KRNA)
1) Role: an agency general manager who had been involved in the PFS as a spender
2) Time & Place: 10:10-11:00, 13th December 2012, a meeting room in the Korean Rail Network Authority Building; 14th November 2013 (written reply)

3. A general manager from the Korean Rail Network Authority (KRNA)
1) Role: an agency general manager who had been involved in the PFS as a spender
2) Time & Place: 11:10-12:00, 11th December 2012, a meeting room in the Korean Rail Network Authority Building; 3rd December (telephone)

4. A deputy director from Daegu Metropolitan City
1) Role: a local government officer who had been involved in the PFS as a spender
2) Time & Place: 13:10-14:00, 14th Dec 2012, a meeting room in Daegu Metropolitan City

5. A director of from Daegu Metropolitan City
1) Role: a local government officer who had been involved in the PFS as a spender
2) Time & Place: 14:10-15:00, 14th Dec 2012, a meeting room in Daegu Metropolitan City; 14th November 2013 (written reply)

6. A special committee expert advisor to the Daegu Metropolitan Council
1) Role: a local government officer who had been involved in the PFS as a spender
2) Time & Place: 16:00-17:00, 14th Dec 2012, a meeting room in Daegu Metropolitan Council; 18th November 2013 (written reply)

7. A senior deputy director of the Ministry of Land, Transport and Maritime Affairs (MLTM)

1) Role: a central government officer who had been involved in the PFS as a spender
2) Time & Place: 14:00-15:00, 26th Nov 2012, a meeting room in the Gwa-cheon Government Complex; 21st November 2013 (written reply)

8. A deputy director of the Ministry of Land, Transport and Maritime Affairs (MLTM)
1) Role: a central government officer who had been involved in the PFS as a spender
2) Time & Place: 15:20-16:30, 26th Nov 2012, a meeting room in the Gwa-cheon Government Complex; 4th December 2013 (telephone)

9. A senior deputy director of the Ministry of Land, Transport and Maritime Affairs (MLTM)
1) Role: a central government officer who had been involved in budget allocation and the PFS for large-scale projects as a spender
2) Time & Place: 17:00-18:30, 26th Nov 2012, a meeting room in the Gwa-cheon Government Complex; 21st November 2013 (written reply)

10. A director of the Ministry of Knowledge Economy (MOKE)
1) Role: a central government officer who had been involved in budget allocation and the PFS for large-scale projects as a spender
2) Time & Place: 09:00-10:30, 27th Nov 2012, a meeting room in the Gwa-cheon Government Complex; 14th November 2013 (written reply)

11. A deputy director of the Ministry of Knowledge Economy (MOKE)
1) Role: a central government officer who had been involved in budget allocation and the PFS for large-scale projects as spender
2) Time & Place: 10:40-11:30, 27th Nov 2012, a meeting room in the Gwa-cheon Government Complex

12. A senior deputy director of the Ministry of Knowledge Economy (MOKE)
1) Role: a central government officer who had been involved in budget allocation and the PFS for large-scale projects as a spender
2) Time & Place: 11:40-12:30, 27th Nov 2012, a meeting room in the Gwa-cheon Government Complex; 21st November 2013 (written reply)

1.2. List of interviewees from policy analysts

13. A specialist of the Public and Private Infrastructure Investment Management Centre (PIMAC)
1) Role: a policy analyst who had been involved in the PFS for transportation projects as a member of the KDI
2) Time & Place: 14:00-15:10, 4th Dec 2012, a meeting room in the KDI; 28th

November 2013 (written reply)

14. An RSF unit head in the Public and Private Infrastructure Investment Management Centre (PIMAC)
1) Role: a policy analyst who had been involved in the PFS for transportation projects as a member of the KDI
2) Time & Place: 15:30-16:40, 4th Dec 2012, a meeting room in the KDI; 27th November 2013 (written reply)

15. A specialist from the Public and Private Infrastructure Investment Management Centre (PIMAC)
1) Role: a policy analyst who had been involved in the PFS for transportation projects as a member of the KDI
2) Time & Place: 14:00-15:20,3th Dec 2012, a meeting room in the KDI

16. An associate specialist from the Public and Private Infrastructure Investment Management Centre (PIMAC)
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as a member of the KDI
2) Time & Place: 16:50-17:40, 4th Dec 2012, a meeting room in the KDI

17. A specialist from the Public and Private Infrastructure Investment Management Centre (PIMAC)
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as member of the KDI
2) Time & Place: 15:30-16:40, 3th Dec 2012, a meeting room in the KDI; 27th November 2013 (written reply)

18. A specialist from the Public and Private Infrastructure Investment Management Centre (PIMAC)
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as member of the KDI
2) Time & Place: 13:00-14:00, 4th Dec 2012, a meeting room in the KDI; 20th November 2013 (written reply)

19. A professor from the University of Seoul
1) Role: a policy analyst who had been involved in the PFS for transportation projects as a professor
2) Time & Place: 16:00-17:20, 29th Nov 2012, the professor's office in the university; 2nd December 2013 (written reply)

20. A professor from the University of Seoul

1) Role: a policy analyst who had been involved in the PFS for transportation projects as a professor
2) Time & Place: 16:00-17:20, 30th Nov 2012, the professor's office in the university; 14th November 2013 (written reply)

21. A professor from Hanyang University
1) Role: a policy analyst who had been involved in the PFS for transportation projects as a professor
2) Time & Place: 10:00-11:30, 30th Nov 2012, cafe around interviewee's house

22. An associate professor from Myong-Ji University
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as a professor
2) Time & Place: 10:00-11:30, 13th Dec 2012, the professor's office in the university; 15th November 2013 (written reply)

23. An associate professor from Sogang University
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as a professor
2) Time & Place: 10:00-11:20, 10th Dec 2012, the professor's office in the university; 17th November 2013 (written reply)

24. A professor from Ajou University
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as a professor
2) Time & Place: 14:00-15:10, 10th Dec 2012, the professor's office in the university

25. A senior manager from the Yooshin Engineering Corporation
1) Role: a policy analyst who had been involved in the PFS for transportation projects as a member of a private company
2) Time & Place: 09:00-10:10, 6th Dec 2012, a company meeting room; 21st November 2013 (written reply)

26. A chief engineer from the Yooshin Engineering Corporation
1) Role: a policy analyst who had been involved in the PFS for transportation projects as a member of a private company
2) Time & Place: 10:20-11:20, 6th Dec 2012, a company meeting room; 21st November 2013 (written reply)

27. A leading engineer from the Yooshin Engineering Corporation

1) Role: a policy analyst who had been involved in the PFS for transportation projects as a member of a private company
2) Time & Place: 11:30-12:40, 6th Dec 2012, a company meeting room

28. An executive from the EGA GROUP
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as a member of a private company 2) Time & Place: 09:00-10:00, 7th Dec 2012, a company meeting; 5th December 2013 (telephone)

29. The CEO of the EGA GROUP
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as a member of a private company
2) Time & Place: 10:10-11:10, 7th Dec 2012, a company meeting room

30. An assistant from the EGA GROUP
1) Role: a policy analyst who had been involved in the PFS for non-transportation projects as a member of a private company 2) Time & Place: 11:30-12:30, 7th Dec 2012, a company meeting room; 5th December 2013 (telephone)

1.3. List of interviewees from the MOSF

31. A deputy director of the Ministry of Strategy and finance (MOSF)
1) Role: a central government officer who had been involved in the budget allocation for large-scale projects as a member of the budget office
2) Time & Place: 14:00-15:30, 27th Nov 2012, a meeting room in the Gwa-cheon Government Complex; 13th November 2013 (written reply)

32. A director of the Ministry of Strategy and Finance (MOSF)
1) Role: a central government officer who had been involved in the budget allocation for large-scale projects as a member of the budget office 2) Time & Place: 16:00-17:00, 27th Nov 2012, an office in the Gwa-cheon Government Complex; 6th December 2013 (telephone)

33. A professor from the Central Officials Training Institute (COTI)
1) Role: a central government officer who had been involved in budget allocation for large-scale projects as a member of the budget office
2) Time & Place: 17:30-16:30, 27th Nov 2012, the professor's office in the COTI; 28th November 2013 (written reply)

34. A deputy director of the Ministry of Strategy and Finance (MOSF)

1) Role: a central government officer who had been involved in budget allocation and the PFS for large-scale projects as a member of the finance policy bureau
2) Time & Place: 14:00-15:00, 28th Nov 2012, a meeting room of in the Gwa-cheon Government Complex; 7th December 2013 (written reply)

35. A senior deputy director of the Ministry of Strategy and Finance (MOSF)
1) Role: a central government officer who had been involved in the budget allocation and the PFS for large-scale projects as a member of the finance policy bureau
2) Time & Place: 15:30-15:40, 28th Nov 2012, a meeting room in the Gwa-cheon Government Complex; 6th December 2013 (telephone)

36. A director of the Ministry of Strategy and Finance (MOSF)
1) Role: a central government officer who had been involved in the budget allocation and the PFS for large-scale projects as a member of the finance policy bureau
2) Time & Place: 19:00-20:10, 26th Nov 2012, an office in the Gwa-cheon Government Complex; 6th December 2013 (telephone)

1.4. List of interviewees from experts

37. An associate professor from the Seoul National University
1) Role: a professor who had been involved in setting up the PFS guidelines as an expert
2) Time & Place: 12:00-13:30, 17th Dec 2012, a restaurant in the university; 14th November 2013 (written reply)

38. An associate professor from the University of Seoul
1) Role: an expert who had been involved in setting up the PFS guidelines and the PFS
2) Time & Place: 14:00-15:10, 29th Nov 2012, the professor's office; 5th December 2013 (telephone)

39. An associate professor from the University of Seoul
1) Role: an expert who had been involved in setting up the PFS guidelines and the PFS
2) Time & Place: 18:00-19:10, 29th Nov 2012, the professor's office; 15th November 2013 (written reply)

40. A professor from the Ajou University
1) Role: an expert who had been involved in setting up the PFS guidelines and the PFS
2) Time & Place: 07:30-09:00, 12th Dec 2012, a cafe near interviewee's home

41. A team leader from the Public and Private Infrastructure Investment Management

Centre (PIMAC)

1) Role: an expert who had been involved in setting up the PFS guidelines and the PFS
2) Time & Place: 16:50-18:00, 3th Dec 2012, a PIMAC meeting room; 15th November 2013 (written reply)

42. A managing director of the Korean Institute for S&T Evaluation and Planning (KISTEP)

1) Role: an expert who had been involved in setting up the PFS guidelines and the PFS
2) Time & Place: 10:00-11:30, 29th Nov 2012, the interviewee's office; 26th November 2013 (written reply)

Appendix 2: Topic guide for first interview

2-1. Guide for interviewing spenders

Dear Participants,

First of all, I would really appreciate your help, despite your busy schedule. I am a doctoral research candidate at the University of Birmingham in the UK. I am doing research on the impact of the Korean Preliminary Feasibility Study (PFS) on budgetary decisions. I am going to give you information and invite you to be part of this research.

This project seeks to understand what the effects of the Korean Preliminary Feasibility Study on the budgetary decision are. The overall aim of the projects is to improve government budgeting and policy decisions by suggesting alterations to, or an alternative methodology for, the PFS. Moreover, this project may be able to suggest ways of preventing or containing the non-neutral behaviour of stakeholders in the PFS.

Information gathered through this research will form the basis of articles to be published in academic journals and policy papers. Participants' contributions can be anonymised, according to their wishes (see Participant Consent Form).

A copy of your interview transcript will be provided, free of charge, on request; and you may withdraw from the project at any time before the end of February 2014.

Data storage and retention will follow the Code of Practice for Research of the University of Birmingham and guidance from the UK Research Council. The data will normally be preserved and accessible for ten years following the completion of the research, subject to the required confidentiality and anonymity conditions.

If you wish to make any additions or amendments to the above statements, or to the research, please do not hesitate to contact me. Thank you again for your time and consideration.

Sungwon Lee, Ph.D Candidate
[redacted]

1. General questions

① Please tell me your job and position, your major subject in school and something about your career .

② Please tell me about your experience of the PFS or budget allocation for large-scale projects.

③ What do you think about the effect of the PFS son public finance and the efficiency of large-scale projects?

④ Please tell me what you think are the serious issues or problems of budget allocation for large-scale projects, including those that involve the PFS.

2. About the objectives of stakeholders in budget allocation for large-scale projects

① Who do you consider to be the stakeholders in the determination of budgets for large-scale projects, including in the PFS? Please list everybody you can think of.

①-1. What do you think the role and behaviour of each stakeholder should be in order to produce effective budget allocation for large-scale projects?

①-2. According to your experience, is there any difference between the expected role and behaviour and the real role and behaviour of each stakeholder in determining budgets for large-scale projects, including in the PFS? What are the reasons of this difference?

② Please tell me what your goal or objective is in determining the budget for a large-scale projects, including in the PFS. How about other stakeholders?

(Prompts) e.g. analytical integrity, maximization of their budget, minimal net budgetary expenditure, responsibility for clients (MOSF, Assembly).

③ According to your experience, what kind of expert knowledge and information does each stakeholder have?

(Prompts) e.g. economic knowledge, analytical knowledge including B/C, engineering knowledge, financial knowledge…

③-1. According to your experience, is there any information asymmetry among stakeholders? If there is any, could you explain it for me? Are there any differences according to project types?

3. About the behaviour of stakeholders in budget allocation for large-scale projects?

3.1.Behaviour of spenders

① Please tell me what kind of projects you think should be given a budget.

①-1. Do you want to get budgets for projects of which the benefits are concentrated in a specific region but the costs are borne by the whole country?
①-2. Do you want to get budgets for projects of which the cost is bigger than the benefits?
①-3. Do you support any alternative to the status quo (not projects)?

② What kind of effort do you make to demonstrate your projects' feasibility to policy analysts at the level of appraisal sub-factors ?

(Prompts) e.g. appraisal sub-factors: economic (B/C), policy factors, and regional factors

②-1. What kind of effort do you make to get budgets allocated to your projects?

③ Do you have any experience of asking for budget allocation on projects which were appraised as non-feasible. (Whom did you ask, how, why, and were you successful?)

④ Do you offer project information to other stakeholders fully and correctly?

3.2.Behaviour of the KDI (policy analysts)

① What do you think about the amount of power policy analysts have on the decisions that lead to PFS results?

② Do you think policy analysts have a generous tendency in the PFS?
What do you think about the reasons of this generous tendency?

(Prompts) e.g. generous tendency: (policy analysts) pass the project through manipulating the score and weighting on their favored projects during the PFS, (MOSF, spenders) obtain or ask for budget allocations on projects which are appraised as 'non-feasible'.

3.3.Behaviour of the MOSF

① Do you know of any projects which were appraised as non-feasible but received a budget allocation? What do you think about that? Why did the MOSF make that decision?

①-1. Are there any differences between transportation projects and others?

② Do you know of any projects which were appraised as feasible but were suspended? What do you think about that? Why did the MOSF make that decision?

②-1. Are there any differences between transportation projects and others?

4. About the effects of the scoring and weighting methodology on PFS results

4.1.Appropriateness of nine-point scale methodology

① Do you know about the discretization of ratio scales on the nine-point scale which is used for converting each appraisal factor's score into a standard priority score which can be part of the AHP score?

(Prompts) e.g. discretization of ratio scales on the nine-point scale: nine-point scale for changing B/C ratio into economic priority may exaggerate the effect of a B/C ratio around B/C = 1 on the AHP score, as follows.

(9 point scale for B/C ratio)

B/C ratio	9-point scale methodology (status quo)	
	9-point scale	priority
2.54	9	***0.9***
2.0	6.69	***0.87***
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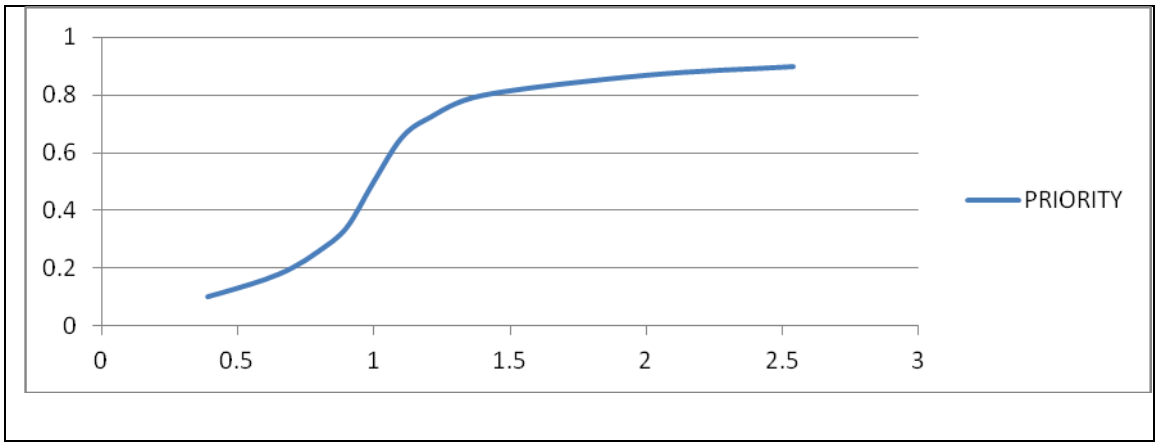
1.2	2.57	***0.72***
1.1	1.82	***0.65***
1.0	1.0	***0.5***
0.90	-1.91	***0.34***
0.80	-2.92	***0.26***
0.70	-4.06	***0.20***
0.60	-5.39	***0.16***
0.50	-6.69	***0.13***
0.39	-9	***0.10***



②What are your concerns about using the nine-point scale for converting a B/C ratio into an AHP score?

③ How do you make use of this asymmetry of the nine-point scale methodology in the process of determining budget allocation for large-scale projects, including in the PFS and the budget allocation process? How about other stakeholders?

4.2.Appropriateness of the weighting methodology of the PFS

① What do you think about the relevance of the current weighting methodology, which allows the policy analyst to set different weightings on appraisal sub-factors for each project, provided the weightings are within the range permitted by PFS guidelines?

①-1. What do you think about the comparative benefits of having a single weighting for each project and a single weighting for each type of project?

5. Closing remarks

① Do you have any ideas for increasing the appropriateness of PFS methodology and curbing the generous tendencies of stakeholders in decisions on budget allocation for large-scale projects?

② Thank you for taking part in the interview. The content of the interview will be completely confidential

③ Supplementary interviews may be requested in the near future.

2-2. Guide for interviewing MOSF officials

Dear Participants,

First of all, I would really appreciate your help, despite your busy schedule. I am a doctoral research candidate at the University of Birmingham in the UK. I am doing research on the impact of the Korean Preliminary Feasibility Study (PFS) on budgetary decisions. I am going to give you information and invite you to be part of this research.

This project seeks to understand what the effects of the Korean Preliminary Feasibility Study on the budgetary decision are. The overall aim of the projects is to improve government budgeting and policy decisions by suggesting alterations to, or an alternative methodology for, the PFS. Moreover, this project may be able to suggest ways of preventing or containing the non-neutral behaviour of stakeholders in the PFS.

Information gathered through this research will form the basis of articles to be published in academic journals and policy papers. Participants' contributions can be anonymised, according to their wishes (see Participant Consent Form).

A copy of your interview transcript will be provided, free of charge, on request; and you may withdraw from the project at any time before the end of February 2014.

Data storage and retention will follow the Code of Practice for Research of the University of Birmingham and guidance from the UK Research Council. The data will normally be preserved and accessible for ten years following the completion of the research, subject to the required confidentiality and anonymity conditions.

If you wish to make any additions or amendments to the above statements, or to the research, please do not hesitate to contact me. Thank you again for your time and consideration.

Sungwon Lee, Ph.D Candidate

1. General questions

① Please tell me your job and position, your major subject in school and something about your career .

② Please tell me about your experience of the PFS or budget allocation for large-scale projects.

③ What do you think about the effect of the PFS son public finance and the efficiency of large-scale projects?

④ Please tell me what you think are the serious issues or problems of budget allocation for large-scale projects, including those that involve the PFS.

2. About the objectives of stakeholders in budget allocation for large-scale projects

① Who do you consider to be the stakeholders in the determination of budgets for large-scale projects, including in the PFS? Please list everybody you can think of.

①-1. What do you think the role and behaviour of each stakeholder should be in order to produce effective budget allocation for large-scale projects?

①-2. According to your experience, is there any difference between the expected role and behaviour and the real role and behaviour of each stakeholder in determining budgets for large-scale projects, including in the PFS? What are the reasons of this difference?

② Please tell me what your goal or objective is in determining the budget for a large-scale projects, including in the PFS. How about other stakeholders?

(Prompts) e.g. analytical integrity, maximization of their budget, minimal net budgetary expenditure, responsibility for clients (MOSF, Assembly).

③ According to your experience, what kind of expert knowledge and information does each stakeholder have?

(Prompts) e.g. economic knowledge, analytical knowledge including B/C, engineering knowledge, financial knowledge…

③-1. According to your experience, is there any information asymmetry among stakeholders? If there is any, could you explain it for me? Are there any differences according to project types?

3. About the behaviour of stakeholders in obtaining budget allocation for large-scale projects

3.1.Behaviour of spenders

① Do you think it is possible for spenders to manipulate the B/C score? Especially when the B/C is around 1.

①-1. What kind of efforts do spenders make to demonstrate their projects' feasibility to other stakeholders? Other than manipulating the B/C ratio?
①-2. What kind of efforts do spenders make to obtain budget allocation on your projects?

② Do you think spenders provide information to other stakeholders fully and correctly?

②-1. What are the ways to obtain information on projects other than from spenders?
②-2. What kinds of projects are difficult for you to analyze and understand?

3.2.Behaviour of the KDI (policy analysts)

① What do you think about the amount of power policy analysts have on the decisions that lead to PFS results?

② Do you think policy analysts have a generous tendency in the PFS?
What do you think about the reasons of this generous tendency?

(Prompts) e.g. generous tendency: (policy analysts) pass the project through manipulating the score and weighting on their favored projects during the PFS, (MOSF, spenders) obtain or ask for budget allocations on projects which are appraised as 'non-feasible'.

3.3. Behaviour of MOSF officials

① What are the factors which play an important role in determining budget allocation for large-scale projects? Could you tell me the factors, in order of importance?

(Prompts) e.g. project's scale, AHP score, B/C score, political pressure, presidential

projects….

② Do you trust the PFS result supplied by the KDI ? How much? If you do not trust them at all, what is the reason? (MOSF)

③ Do you have any experience of allocating budgets for projects which have been appraised as non-feasible? Why did you make that decision?

③-1. Are there any differences between transportation projects and others?

④ Do you have any experience of suspending projects which have been appraised as feasible? Why did you make that decision?

④-1. Are there any differences between transportation projects and others?

⑤ Do you have any experience of asking the KDI to amend the PFS score during the PFS? If you do, why did you ask them to do this?

4.

4.About the effects of the scoring and weighting methodology on PFS results

4.1.Appropriateness of nine-point scale methodology

① Do you know about the discretization of ratio scales on the nine-point scale which is used for converting each appraisal factor's score into a standard priority score which can be part of the AHP score?

(Prompts) e.g. discretization of ratio scales on the nine-point scale: nine-point scale for changing B/C ratio into economic priority may exaggerate the effect of a B/C ratio around B/C = 1 on the AHP score, as follows.

(9 point scale for B/C ratio)

B/C ratio	9-point scale methodology (status quo)	
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0.60	-5.39	***0.16***
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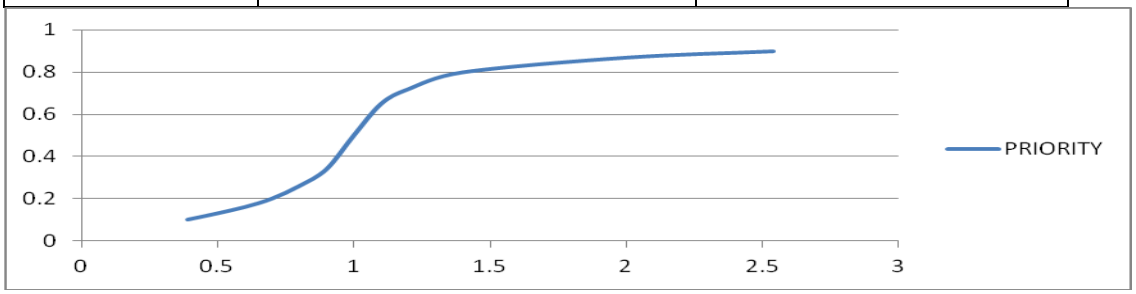

②What are your concerns about using the nine-point scale for converting a B/C ratio into an AHP score?

③ How do you make use of this asymmetry of the nine-point scale methodology in the process of determining budget allocation for large-scale projects, including in the PFS and the budget allocation process? How about other stakeholders?

4.2.Appropriateness of the weighting methodology of the PFS

① What do you think about the relevance of the current weighting methodology, which allows the policy analyst to set different weightings on appraisal sub-factors for each project, provided the weightings are within the range permitted by PFS guidelines?

①-1. What do you think about the comparative benefits of having a single weighting for each project and a single weighting for each type of project?

5. Closing remarks

① Do you have any ideas for increasing the appropriateness of PFS methodology and curbing the generous tendencies of stakeholders in decisions on budget allocation for large-scale projects?

② Thank you for taking part in the interview. The content of the interview will be completely confidential

③ Supplementary interviews may be requested in the near future.

2 -3. Guide for interviewing policy analysts

Dear Participants,

First of all, I would really appreciate your help, despite your busy schedule. I am a doctoral research candidate at the University of Birmingham in the UK. I am doing research on the impact of the Korean Preliminary Feasibility Study (PFS) on budgetary decisions. I am going to give you information and invite you to be part of this research.

This project seeks to understand what the effects of the Korean Preliminary Feasibility Study on the budgetary decision are. The overall aim of the projects is to improve government budgeting and policy decisions by suggesting alterations to, or an alternative methodology for, the PFS. Moreover, this project may be able to suggest ways of preventing or containing the non-neutral behaviour of stakeholders in the PFS.

Information gathered through this research will form the basis of articles to be published in academic journals and policy papers. Participants' contributions can be anonymised, according to their wishes (see Participant Consent Form).

A copy of your interview transcript will be provided, free of charge, on request; and you may withdraw from the project at any time before the end of February 2014.

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If you wish to make any additions or amendments to the above statements, or to the research, please do not hesitate to contact me. Thank you again for your time and consideration.

Sungwon Lee, Ph.D Candidate

1. General questions

① Please tell me your job and position, your major subject in school and something about your career .

② Please tell me about your experience of the PFS or budget allocation for large-scale projects.

③ What do you think about the effect of the PFS son public finance and the efficiency of large-scale projects?

④ Please tell me what you think are the serious issues or problems of budget allocation for large-scale projects, including those that involve the PFS.

2. About the objectives of stakeholders in budget allocation for large-scale projects

① Who do you consider to be the stakeholders in the determination of budgets for large-scale projects, including in the PFS? Please list everybody you can think of.

①-1. What do you think the role and behaviour of each stakeholder should be in order to produce effective budget allocation for large-scale projects?

①-2. According to your experience, is there any difference between the expected role and behaviour and the real role and behaviour of each stakeholder in determining budgets for large-scale projects, including in the PFS? What are the reasons of this difference?

② Please tell me what your goal or objective is in determining the budget for a large-scale projects, including in the PFS. How about other stakeholders?

(Prompts) e.g. analytical integrity, maximization of their budget, minimal net budgetary expenditure, responsibility for clients (MOSF, Assembly).

③ According to your experience, what kind of expert knowledge and information does each stakeholder have?

(Prompts) e.g. economic knowledge, analytical knowledge including B/C, engineering knowledge, financial knowledge…

③-1. According to your experience, is there any information asymmetry among stakeholders? If there is any, could you explain it for me? Are there any differences according to project types?

3. About the behaviour of stakeholders in obtaining budget allocation for large-scale projects

3.1.Behaviour of spenders

① Do you think it is possible for spenders to manipulate the B/C score? Especially when the B/C is around 1.

①-1. What kind of efforts do spenders make to demonstrate their projects' feasibility to other stakeholders? Other than manipulating the B/C ratio?
①-2. What kind of efforts do spenders make to obtain budget allocation on your projects?

② Do you think spenders provide information to other stakeholders fully and correctly?

②-1. What are the ways to obtain information on projects other than from spenders?
②-2. What kinds of projects are difficult for you to analyze and understand?

3.2.Behaviour of the KDI (policy analysts)

① According to your experience, what do you think is the goal or objective of other policy analysts (professors, private company experts and other KDI analysts) ?

(Prompts) e.g. analytical integrity, interests of client, personal values...

①-1. Do you have any experience of advocacy for specific projects, in order to achieve your own goals? If you do, could you tell me the details?

①-2. Do you have any experience of other policy analysts' advocacy for specific project, in order to achieve their own goals? If you do, could you tell me the details?

② Do you have any experience of cognition bias during the PFS? If you do, could you tell me the details?

②-1. How about other policy analysts?

(Prompts) cognition bias (e.g.)

① the tendency to search for or interpret information in a way that confirms one's preconceptions. This is related to the concept of congnitive dissonance.

② when someone's evaluation of the logical strength of an argument is biased by their belief in the truth or falsity of the conclusion.

③ using a too-narrow approach to, or description of, a situation or issue

④ sometimes called the 'I – knew-it-all-along' effect, this bias is the inclination to see past events as being predictable.

⑤ analysts do not know the frequency or probability of instances in the outside world, and so cannot follow the normative rule of using objective measures.

⑥ Analysts who lack confidence in their judgment can play safe and select responses that lie too close to the reference magnitude. ['select responses that do not tend in any one direction'?]

③ Do you think that advocacy and cognition bias can affect feasibility decisions?

③-1. Do you think that policy analysts have generous tendencies in the PFS? What do you think are the reasons for these generous tendencies?

(Prompts) e.g. generous tendencies: (policy analysts) pass the project through manipulating the scores and weightings for their favored projects during the PFS, (MOSF, spenders) obtaining budget allocations or asking for budget allocations on projects which have been appraised as 'non-feasible'.

④ Do you have any experience of being asked by another stakeholder to change the PFS results during the process?, If you do, could you tell me the details?

4. About the effects of the scoring and weighting methodology on PFS results

4.1.Appropriateness of the nine-point scale methodology

① Do you know about the discretization of ratio scales on the nine-point scale which is used for converting each appraisal factor's score into a standard priority score which can be part of the AHP score?

(Prompts) e.g. discretization of ratio scales on the nine-point scale: nine-point scale for changing B/C ratio into economic priority may exaggerate the effect of a B/C ratio around B/C = 1 on the AHP score, as follows.

(9 point scale for B/C ratio)

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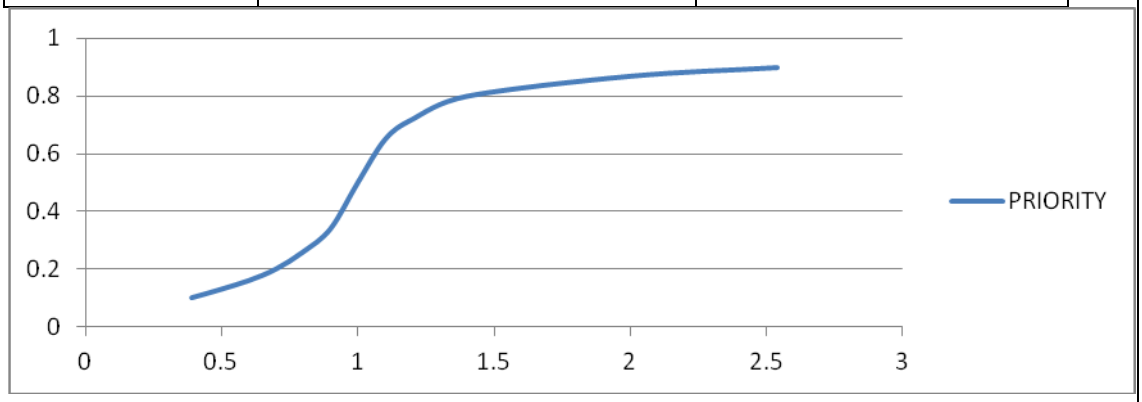

② What is your concern about using the nine-point scale methodology through which the B/C ratio has a significant impact on the AHP score when the B/C ratio is around 1?

②-1. What do you think about the appropriateness of the nine-point scale methodology which is used for converting subjective appraisal sub-factors (policy factors) into AHP scores?

②-2. How do you make use of the asymmetry of the nine-point scale methodology in the PFS? How about other stakeholders?

③ Do you know about the balanced scale methodology which is proposed as an alternative to the nine-point scale methodology? (All interviewee)

③-1. What do you think about the adoption of the balanced scale methodology for the PFS? What do you think about the appropriateness of the balanced scale methodology? (All interviewees)

(Prompt) e.g. balanced scale methodology: there is no asymmetry among the effects of the B/C scale on the AHP score

4.2.Appropriateness of the weighting methodology of the PFS

① Could you tell me about the weighting process in detail?

①-1. What is the objective judgment standard for weightings at the level of 1 (among economic, policy and regional factors)

①-2. What are your judgment standards for weightings at the level of 1 (among economic, policy and regional factor)? How about other analysts?

①-3. Are there any differences among the weightings at the level of 1 (among economic, policy and regional factors) according to the project types (transportation and others)?

② Do you know whether there is a strong correlation between the score and weighting on each sub appraisal factor in specific projects? Do you have any concern about this? What are the reasons for it?

②-1. Do you have any experience of considering the score and weighting at the same time in the PFS? How about other stakeholders?

③ What do you think about the relevance of the current weighting methodology which allows policy analysts to set weightings on appraisal sub-factors differently according to the each project, as long as they are within the permitted range?

③-1. What do you think about the issue of putting a single weighting on each project and a single weighting on each type of project?

5. Closing remarks

① Do you have any ideas for increasing the appropriateness of PFS methodology and curbing the generous tendencies of stakeholders in decisions on budget allocation for large-scale projects?

② Thank you for taking part in the interview. The content of the interview will be completely confidential

③ Supplementary interviews may be requested in the near future.

2-4. Guide for interviewing experts

Dear Participants,

First of all, I would really appreciate your help, despite your busy schedule. I am a doctoral research candidate at the University of Birmingham in the UK. I am doing research on the impact of the Korean Preliminary Feasibility Study (PFS) on budgetary decisions. I am going to give you information and invite you to be part of this research.

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If you wish to make any additions or amendments to the above statements, or to the research, please do not hesitate to contact me. Thank you again for your time and consideration.

Sungwon Lee, Ph.D Candidate
Institute of Local Government Studies
The University of Birmingham
Edgbaston, Birmingham, B15 2TT, United Kingdom

1. General questions

① Please tell me your job and position, your major subject in school and something about your career .

② Please tell me about your experience of the PFS or budget allocation for large-scale projects.

③ What do you think about the effect of the PFS son public finance and the efficiency of large-scale projects?

④ Please tell me what you think are the serious issues or problems of budget allocation for large-scale projects, including those that involve the PFS.

2. About the objectives of stakeholders in budget allocation for large-scale projects

① Who do you think are the stakeholders who determine the budgets for large-scale projects, including in the PFS? Tell me everybody you think of.

①-1. Could you tell me what the goals or objectives are of each stakeholder in the determination of budgets for large-scale projects, including in the PFS?

(Prompts) e.g. analytical integrity, maximization of their budget, minimal net budgetary expenditure, responsibility for clients (MOSF, Assembly)…

② What kind of expert knowledge and information does each stakeholder have?

(Prompts) e.g. economic knowledge, analytical knowledge including B/C, engineering knowledge, financial knowledge…

②-1. Are there any information asymmetries among the stakeholders? If there are, could you explain them for me? Are there any differences according to project type?

③ What do you think the role and behaviour of each stakeholder should be for desirable PFS and budget allocations for large-scale projects?

③-1. Is there any difference between the expected role and behaviour and the real role and behaviour of each stakeholder in the determination of budgets for large-scale projects, including in the PFS? What is the reason of this difference?

3. About the behaviour of stakeholders in getting budget for large-scale projects

3.1. Behaviour of spenders

① Do you think it is possible for spenders to manipulate the B/C score? Especially when the B/C is around 1.

①-1. What kind of efforts do spenders make to demonstrate their projects' feasibility to other stakeholders? Other than manipulating the B/C ratio?
①-2. What kind of efforts do spenders make to obtain budget allocation on your projects?

② Do you think spenders provide information to other stakeholders fully and correctly?

3.2. Behaviour of the KDI (policy analysts)

① According to your experience, what do you think is the goal or objective of other policy analysts (professors, private company experts and other KDI analysts) ?

(Prompts) e.g. analytical integrity, interests of client, personal values...

② Do you think that are there any cognition bias during the PFS? If any, could you tell me the details?

(Prompts) cognition bias (e.g.) ① the tendency to search for or interpret information in a way that confirms one's preconceptions. This is related to the concept of congnitive dissonance. ② when someone's evaluation of the logical strength of an argument is biased by their belief in the truth or falsity of the conclusion. ③ using a too-narrow approach to, or description of, a situation or issue ④ sometimes called the 'I – knew-it-all-along' effect, this bias is the inclination to see past events as being predictable. ⑤ analysts do not know the frequency or probability of instances in the outside world, and so cannot follow the normative rule of using objective measures. ⑥ Analysts who lack confidence in their judgment can play safe and select responses that lie too close to the reference magnitude. ['select responses that do not tend in any one direction'?]

③ Do you think that advocacy and cognition bias can affect feasibility decisions?

③-1. Do you think that policy analysts have generous tendencies in the PFS? What do you think are the reasons for these generous tendencies?

(Prompts) e.g. generous tendencies: (policy analysts) pass the project through manipulating the scores and weightings for their favored projects during the PFS, (MOSF, spenders) obtaining budget allocations or asking for budget allocations on projects which have been appraised as 'non-feasible'.

3.3.Behaviour of MOSF officials

① What are the factors which play an important role in determining budget allocation for large-scale projects? Could you tell me the factors, in order of importance?

(Prompts) e.g. project's scale, AHP score, B/C score, political pressure, presidential projects….

4. About the effects of the scoring and weighting methodology on PFS results

4.1.Appropriateness of the nine-point scale methodology

① Do you know about the discretization of ratio scales on the nine-point scale which is used for converting each appraisal factor's score into a standard priority score which can be part of the AHP score?

(Prompts) e.g. discretization of ratio scales on the nine-point scale: nine-point scale for changing B/C ratio into economic priority may exaggerate the effect of a B/C ratio around B/C = 1 on the AHP score, as follows.

(9 point scale for B/C ratio)

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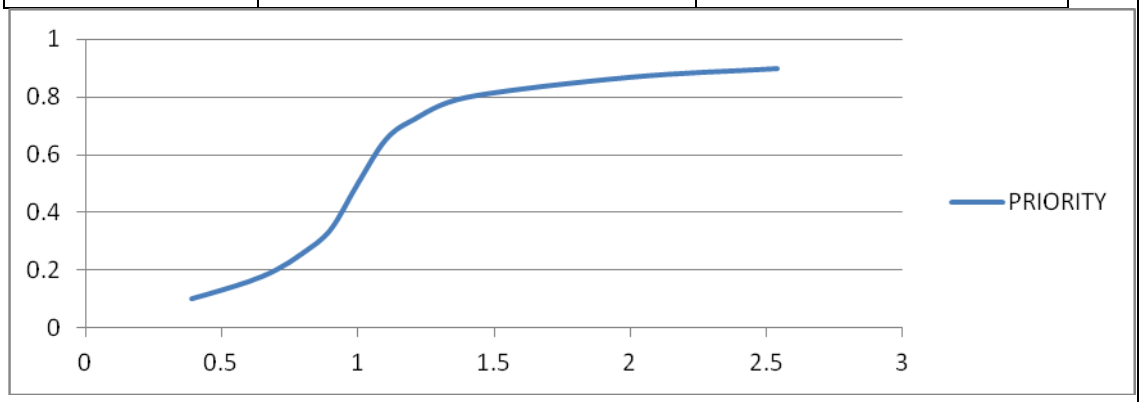

② What is your concern about using the nine-point scale methodology through which the B/C ratio has a significant impact on the AHP score when the B/C ratio is around 1?

③ Do you know about the balanced scale methodology which is proposed as an alternative to the nine-point scale methodology? (All interviewee)

③-1. What do you think about the adoption of the balanced scale methodology for the PFS? What do you think about the appropriateness of the balanced scale methodology?

(Prompt) e.g. balanced scale methodology: there is no asymmetry among the effects of the B/C scale on the AHP score

④ What do you think about other issue on scale methodology?

4.2.Appropriateness of the weighting methodology of the PFS

① Could you tell me about the weighting process in detail?

①-1. What is the objective judgment standard for weightings at the level of 1 (among economic, policy and regional factors)
①-2. What should be the judgment standards for weightings at the level of 1 (among economic, policy and regional factor)? How about other analysts?
①-3. Are there any differences among the weightings at the level of 1 (among economic, policy and regional factors) according to the project types (transportation and others)?

② Do you know whether there is a strong correlation between the score and weighting on each sub appraisal factor in specific projects? Do you have any concern about this? What are the reasons for it?

③ What do you think about the relevance of the current weighting methodology which allows policy analysts to set weightings on appraisal sub-factors differently according to the each project, as long as they are within the permitted range?

③-1. What do you think about the issue of putting a single weighting on each project and a single weighting on each type of project?

5. Closing remarks

① Do you have any ideas for increasing the appropriateness of PFS methodology and curbing the generous tendencies of stakeholders in decisions on budget allocation for large-scale projects?

② Thank you for taking part in the interview. The content of the interview will be completely confidential

③ Supplementary interviews may be requested in the near future.

Appendix 3 Topic guide for supplementary interviews

Dear Participants,

First of all, I'd like to say again that I really appreciate your help last year. According to the results of the first interviews, I have learned that PFS results affect budget decisions, and there is non-neutral behaviour by stakeholders in the PFS.

I should therefore like to ask you some further questions. In this interview, I want to ask your opinions on the results of my analysis and the possible policy alternatives to the current PFS. Your valuable answers will enable me to make more realistic and feasible policy alternatives for a better PFS.

I once more declare that all your answers will be kept confidential, and will only be quoted anonymously. I will not be sharing specific information about your responses with anyone. The findings will be presented as a part of my thesis, but no identifying information will ever be available to anyone.

If you wish to make any additions or amendments to your answers or the research, please do not hesitate to contact me. Thank you again for your time and consideration.

Sungwon Lee, Ph.D Candidate

1. From studying the first interviews and quantitative analysis, I found two important points about the relationship between PFS results and budgetary decisions. Firstly, feasibility decisions (AHP≥0.5 or not) which are arrived at through the PFS play a positive role in budget approval decisions. According to this result, we can expect that projects which are appraised as feasible through the PFS are more likely to receive budget approve. Secondly, the AHP score plays a positive role in the speed of budget allocation for a project in the mid term or long term. Furthermore, the impact of this score increases as time goes on. According to this result, we can expect that projects which have a high AHP score are likely to be constructed more quickly than others.

    - Do you think that these results are appropriate in terms of your own experience? If so, why? If not, why not?

2. PFS results may be affected by PFS methodology, because PFS results (AHP score and feasibility decision) are produced through the PFS methodology, which is composed of scoring and weighting methodologies. A nine-point scale methodology was adapted as the current scoring methodology; and a weighting methodology in which policy analysts can set different weightings for each project was adapted for the current weighting methodology (KDI 2008). The first interview results showed that some interviewees were concerned about using the nine-point scale for converting the B/C ratio into an AHP score, because the nine-point scale exaggerates the effect of the B/C ratio on the AHP score around B/C ratio = 1. Some interviewees were also concerned about using the current weighting methodology, because this allows policy analysts too much discretionary power to make feasibility decisions. We suggest five alternative methodologies for the current PFS, drawing on the interview results and the previous research on alternative systems. These five alternative methodologies can be made by combining the alternative scoring methodologies (balanced scale methodology in which differences in the B/C ratio can be reflected in the AHP score equally, right across the range of the scale) and alternative weighting methodologies (same weighting set within the same type of projects or for all projects).

Table: Alternative methodology to current AHP system

			Scale methodology on B/C ratio	
			9-point scale (current methodology)	*Balanced scale (alternative)*
Weighting methodology	Different weights for projects (current methodology)		Current methodology	*Type 1*
	Same weights	*Within each project type (alternative)*	*Type 2*	*Type 3*
		For all projects (alternative)	*Type 4*	*Type 5*

- Which is your preferred alternative? For what reasons?
- If there is no preferred alternative among the proposed alternatives, what is the alternative methodology which you would like to recommend?

3. Drawing on the first interview results, I found that some interviewees referred to the possibility of non-neutral behaviour by policy analysts who took part in the PFS, and this contradicts the expected role of policy analysts as objective technicians for the purposes of the PFS. In this study, non-neutral behaviour means that policy analysts appraise the projects with their own values and non-neutral policy analysts are likely to be for or against projects with no objective evidence. According to the first interviews and previous research, non-neutral behaviour by stakeholders in the PFS could be divided into four types according to their intentionality (intended: aware of their bias when they exhibit it; unintended: not aware of their bias when they exhibit it), and the direction of their bias (over-stating feasibility or under–estimating feasibility), as follows:

Table : Non-neutral behaviour according to intention and tendency

		Bias	
		Over-stating feasibility	Under–estimating feasibility
Intentionality	Intended	Type 1	Type 2
	Unintended	Type 3	Type 4

- Do you think that these results are appropriate in terms of your experience? If so, why? If not, why not?
- Are you concerned about the existence of this non-neutral behaviour? If so, why? If not, why not?

- What do you think about the classification of these non-neutral behaviours into four types?

4. From studying the first interview results, we found that the stakeholders who took p art in the PFS had conflicting goals, and each stakeholder had a different level of inf ormation about the projects. Through the interview results and literature review, we found that the goal conflicts among the stakeholders and the different levels of infor mation which stakeholders had could be the main reason for these non-neutral behaviours.
   For example, among people who had different goals in the PFS, some who have had plenty of information were likely to withold this information from others who had li ttle information.

   - Do you think that these results are appropriate in terms of your experience? If so, why? If not, why not?
   - What other reasons can you suggest for these non-neutral behaviours?

5. Drawing on the interview results and the literture review, wewere able to suggest several possible policy alternatives for preventing excessive non-neutral behaviour by stakeholder in the PFS.

   5-1. There is no information about the weightings set by each policy analyst in the PFS report, which is open to the public. However, according to the principal-agent theory, it is important to make this information public in order to solve the principal-agent problem. Furthermore, in the first interviews, some interviewees suggested that making weighting information public might be necessary to prevent the non-neutral behaviour of policy analysts. Thus, making public the weightings setby each policy analyst and their name could be one policy alternative for solving the problem of non-neutral behaviour.

   ① Overall, do you agree with this policy alternative?
   (Please select one among agree, partly agree, neutral, disagree)
   ② Could you tell me the reasons why you hold this opinion?

5-2. According to the first interview results, in contravention of the PFS guidelines, policy analysts were likely to score and set the weighting for each appraisal sub-factor at the same time. Indeed, some policy analysts could manipulate their PFS results through considering the score and weighting at the same time. Thus,

'separate the scoring and weighting processes' can be one of the policy alternatives for solving the problem of non-neutral behaviour.

① Overall, do you agree with this policy alternative?
(Please select one among agree, partly agree, neutral, disagree)
② Could you tell me the reasons why you hold this opinion?

5-3. According to the interview results, in contrast to other stakeholders, most private company analysts exhibited client advocacy (intended over-stating bias) and some policy analysts exhibited a certain bias constantly. Thus, excluding biased analysts, especially private company analysts, from the weighting process, could be one of the policy alternative for solving the problem of non-neutral behaviour.

① Overall, do you agree with this policy alternative?
(Please select one among agree, partly agree, neutral, disagree)
② Could you tell me the reasons why?

5-4. According to the Evaluation Research Institute, evaluating and monitoring the consequence of PFS results and the non-neutral behaviours of stakeholders and reflecting the results on their performance and personnel management could be one policy alternative for solving the problem of non-neutral behaviour.

① Overall, do you agree this policy alternative?
(Please select one among agree, partly agree, neutral, disagree)
② Could you tell me the reasons why?

5-5. According to the principal-agent model, lack of competion can be one of the main reason for non-neutral behaviour. As for the current PFS, the KDI have a monopolistic function to control the PFS. Thus, adopting a competitive system for appointing the PFS managing institute and enabling the function of controlling the PFS to pass to another institute can be one of the policy alternatives for solving the problem of non-neutral behaviour.

① Overall, do you agree this policy alternative?
(Please select one among agree, partly agree, neutral, disagree)
② Could you tell me the reasons why?

5-6. Which of these five policy alternatives do you think might be most valuable? List them in order.

5-7. Could you tell me if you have any ideas for policy alternatives to the current PFS or for preventing non-neutral behaviour by policy analysts?

BIBLIOGRAPHY

Ahn, I. (2010). *Public Finance in Korea*. Seoul, Maeil Business Newspaper Inc.

Arkes, H.R. (1991). 'Costs and benefits of judgment errors: implications for debiasing.' *Psychological bulletin*, 110(3): 486.

Arksey, H. (2004). 'Semi-structured and unstructured interviewing.' *Understanding research methods for social policy and practice.*

Arthur, S. and J. Nazroo (2003). 'Designing fieldwork strategies and materials.' *Qualitative research practice: a guide for social science students and researchers*, 1: 109-137.

Ascher, W. (1979). 'Forecasting, an appraisal for policy-makers and planners.'

Bang, M. (2009). *Analysis of the impact of results from the self-assessment of budgetary programmes in budget decisions*. Seoul: Korea, Sungkunkwan University. Doctoral disseration

Bang, M. and Yoon, K. (2006) Analysis of the SABP results in 2006. Korean Society and Public Administration, 2006-5, 409-424

Basile, O., et al. (2010). "A methodology to assess pedestrian crossing safety." *European Transport Research Review* **2**(3): 129-137.

BBC NEWS (2010) HS2 cost and benefit debate not over et. al
http://www.bbc.co.uk/news/business-16467903[Accessed January 20th 2010]

Beckman, N. (1977). 'Policy analysis in government: alternatives to "muddling through".' *Public administration review,* 37(3): 221-253.

Bertelli, A M. (2012). *The political economy of public sector governance*. Cambridge University Press.

Boardman, A.E., et al. (2010). *Cost-benefit analysis*. Upper Saddle River, NJ, Prentice Hall.

Bovaird, T. and E. Löffler (2009). *Public management and governance*, Taylor & Francis.

Breton, A. (1998). *Competitive governments: An economic theory of politics and public finance*, Cambridge University Press.
Bryman, A. (2003). *Quantity and quality in social research*, Routledge.

Bryman, A. (2006) *Integrating quantitative and qualitative research: how is it done? Qualitative Research*, 6(1): 97-113

Bryman, A. (2012). *Social research methods*, Oxford university press.

Butch, L. (2010) Railway: high speed rail (HS2), House of Commons Library.

Chang, M. and Yoon, S. (2002) Empirical Analysis of Determining Factors of Budget Deliberation of the National Assembly. *Korean Policy Studies Review*, 11(2): 100-119

Cho, I. (2010). The impact of Korean performance budgeting on budgetary programmes. Birmingham, UK, University of Birmingham. Doctoral dissertation.

Cook, T.D., D.T. Campbell, et al. (1979). *Quasi-experimentation: design and analysis issues for field settings*,. Boston, Houghton Mifflin.

Creswell, J.W. (2009). *Research design: qualitative, quantitative, and mixed methods approaches*. London, Sage.

Creswell, J.W. and V.L.P. Clark (2007). *Designing and conducting mixed methods research*, Wiley Online Library.

Curristine, T. (2005). 'Government performance: lessons and challenges.' *OECD Journal on budgeting*, 5(1): 127.

Daniels, M. (2002). "Memorandum for Heads of Executive Departments and Agencies: Program Performance Assessments for the FY 2004 Budget." *Executive Office of the President. Washington*, DC, July **16**.

Davies, T. (1998). 'Message from the director.' *Center for Risk Management Newsletter***,** 13.

Davis, O. A., et al. (1966). "A theory of the budgetary process." *The American Political Science Review* **60**(3): 529-547.

De Vaus, D. (2001). *Research design in social research.* London, Sage.

Dixit, A. (2002). 'Incentives and organizations in the public sector: an interpretative review.' *Journal of human resources*: 696-727.

Dror, Y. (1964). "Muddling Through-" Science" or Inertia?" *Public Administration Review*: 153-157.

Dunn, W.N. (1997). 'Probing the boundaries of ignorance in policy analysis.' *American behavioural scientist*, 40(3): 277-298.

Dunn, W.N. (2003). 'Public policy analysis: an introduction.'

Easton, V. J. and J. H. McColl (1997). *Statistics glossary,* Steps.

Elliott, J. and C. Marsh (2008). *Exploring data: an introduction to data analysis for social scientists*. Bristol, Polity.

Fenno, R. F. (1966). *The power of the purse: Appropriations politics in Congress,* Little, Brown Boston.

Festinger, L. (1962). *A theory of cognitive dissonance*, Stanford University Press.

Flyvbjerg, B. (2004). 'COWI (2004) *Procedures for dealing with optimism bias in transport planning-guidance document*.' British Department for Transport.

Flyvbjerg, B. (2008). "Curbing optimism bias and strategic misrepresentation in planning: Reference class forecasting in practice." *European Planning Studies* **16**(1): 3-21.

Flyvbjerg, B. (2009). 'Survival of the unfittest: why the worst infrastructure gets built—and what we can do about it.' *Oxford review of economic policy*, 25(3): 344-367.

Frankfort-Nachmias, C. and D. Nachmias (2007). *Research methods in the social sciences*, Worth Publishers.

Friend, J. and N. Jessop (2013). *Local government and strategic choice: An operational research approach to the processes of public planning*, Routledge.

Frisco, V. and O.J. Stalebrink (2008). 'Congressional use of the program assessment rating tool.' *Public budgeting & finance*, 28(2): 1-19.

GAO (1996) *Executive Guide Effectively Implementing the Government Performance Results Act.* GAO/GGD-96-118. Washington D.C.: GAO.

GAO (1997a) *The Government Performance and Results Act: 1997 Government Implementation will be uneven*. GAO/GGD-97-109. Washington D.C.: GAO.

GAO (1997b) *Performance Budgeting: Past Initiatives Offer Insights for GPRA Implementation.* GAO/AIMD/GGD-99-67. Washington D.C.: GAO.

GAO (1999) *Performance Budgeting: Initial Experiences Under the Results Act in Linking Plans with Budgets*. GAO/AIMD-99-67. Washington D.C.: GAO.

GAO (2001). *Managing for results: federal managers' views on key management issues vary widely across agencies*. Washington, D.C.

GAO (2003) *High-Risk Series: Strategic Human Capital Management*. GAO-03-120. Washington D.C.: GAO.

GAO (2004). *Performance budgeting: observations on the use of OMB's program assessment rating tool for the fiscal year 2004 budget*. Washington, D.C.

GAO (2011) *GPRA Modernization Act Provides Opportunities to Help Address Fiscal, Performance, and Management Challenges*. GAO-11-466T. Washington D.C.: GAO.

Gilmour, J.B. and D.E. Lewis (2006). 'Assessing performance budgeting at OMB: the influence of politics, performance, and program size.' *Journal of public administration research and theory*, 16(2): 169-186.

Goldberger, A. S. (1991). *A course in econometrics*, Cambridge, Mass.

Goldstein, H. and D.J. Spiegelhalter (1996). 'League tables and their limitations: statistical issues in comparisons of institutional performance.' *Journal of the Royal Statistical Society. Series A (Statistics in Society)*: 385-443.

Goodwin, P. and G. Wright (2007). *Decision analysis for management judgment*, John Wiley & Sons.

Graziano, A.R.M. and M. Raulin (1998). *Research methods: a process of inquiry*. London, R.R. Donnely.

Ha, Y. (2002) The new trend of Institutional Theory: Theoretical self-innovation and convergence. *Korean Review of Public Administration*, 36(4): 339-359

Harker, P. T. and L. G. Vargas (1987). "The theory of ratio scale estimation: Saaty's analytic hierarchy process." *Management Science* **33**(11): 1383-1403.

HM Treasury (2011). T*he green book: appraisal and evaluation in central government: Treasury guidance*. Stationery Office.

Holder, R. (1990). 'Some comments on the analytic hierarchy process.' *Journal of the Operational Research Society*: 1073-1076.

Hoppe, R. (1999). "Policy analysis, science, and politics: from" speaking truth to power" to" making sense together"'. *Science and Public Policy*, 26(3):201-210

Huberty, C. J. (1989). "Problems with stepwise methods—better alternatives." *Advances in social science methodology* **1**: 43-70.

Hughes, A. and O. Watch (2006). "Testimony to the Senate Homeland Security and Government Affairs Subcommittee on Federal Financial Management, Government Information, and International Security." *International Security*.

Ishizaka, A. and A. Labib (2009). "Analytic hierarchy process and expert choice: Benefits and limitations." *OR Insight* **22**(4): 201-220.

Jackson, P. M. (2011). "Governance by numbers: what have we learned over the past 30 years?" *Public Money & Management* **31**(1): 13-26.

Jackson, P. M. (2013). "Debate: Fraud risk management in the public sector." *Public Money & Management* **33**(1): 6-8.

Jacobs, R. and M. Goddard (2007). 'How do performance indicators add up? An examination of composite indicators in public services.' *Public money and management*, 27(2): 103-110.

Jenkins-Smith, H. C. (1982). "Professional roles for policy analysts: A critical assessment." *Journal of Policy Analysis and Management* **2**(1): 88-100.

Johnson, B. and L. Christensen (2008). *Educational research: Quantitative, qualitative, and mixed approaches*, Sage.

Johnson, B. and L. Christensen (2008). *Educational research: quantitative, qualitative, and mixed approaches*. London, Sage.

Jung, M.K. (2012). (An) impact analysis of the performance information on the budget decision-making : based on the Korea's program assesment ratings. *Public administration*. Seoul, Korean University. Ph.D: 233

Kahneman, D. (1994). 'New challenges to the rationality assumption.' *Journal of institutional and theoretical economics (JITE)*: 18-36.

Kahneman, D., et al. (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge University Press.

Kang, S. (2000) *Financial Administration*. Seoul: Parkyoungsa.

KDI (2006a). PFS report, *Beulnae Railroad construction*. Seoul: Korea.

KDI (2006b). PFS report, *national road construction (Okdong-Nongso)*. Seoul: Korea.

KDI (2006c). PFS report, *Youngsang Gang riverside road construction*. Seoul: Korea.

KDI (2007a). PFS report, *Daegue EXCO construction*. Seoul: Korea.

KDI (2007b). PFS report, *Pusan Buk harbor redevelopment*. Seoul: Korea.

KDI (2007c). PFS report, *national road construction (Osong-Chungju)*. Seoul: Korea.

KDI (2007d). PFS report, *national road construction (Donghae-Okgae)*. Seoul: Korea.

KDI (2007e). PFS report, *national road construction (Hongcheon-Chunchen)*. Seoul: Korea.

KDI (2008a). PFS report, *national road construction (Pohang-Hunghae)*. Seoul: Korea.

KDI (2009b). PFS report, *principal road construction for Myunggi*. Seoul: Korea.

KDI (2009c). PFS report, *incomming railroad for Ulsan new harbor*. Seoul: Korea.

KDI (2009d). PFS report, *Nanmgang Dam redevelopment*. Seoul: Korea.

KDI (2009e). PFS report, *Gyungbook University clinical training building*. Seoul: Korea.

KDI (2010a). PFS report, *urban railroad construction(Sasang-Hadan)*. Seoul: Korea.

KDI (2010b). PFS report, *national road construction (Shinan-Sengbirang)*. Seoul: Korea.

KDI (2010c). PFS report, *Seoul National University medical trement building*. Seoul: Korea.

KDI (2010d). PFS report, u*rban railroad construction (Gyangju 2nd)*. Seoul: Korea.

KDI (2001). *General guidelines for the implementation of PFS*. Seoul, Korean Development Institution.

KDI (2003). *General guidelines for the implemention of PFS*. Seoul, Korean Development Institution.

KDI (2005). *General guideline for the implement of PFS*. Seoul, Korean Development Institution.

KDI (2008b). *General guidelines for the implementation of PFS*. Seoul, Korean Development Institution.

KDI (2012). *General guideline for the implementation of PFS*. Seoul, Korean Development Institution.

Keller, G. (2011). *Statistics for management and economics*, South-Western Pub.

Kerr, N.L., et al. (1996). 'Bias in judgment: comparing individuals and groups.' *Psychological review*, 103(4): 687.

Kim, E. S. (2010) Thick Policy Study: How Can We Do Post-Positivist Policy Studies?. *Bulletin of Korea Policy Society*, 19(4): 157-537.

Kim, J. (2011). *Policy implementation and formation in Korea: A study of policy towards public enterprises in 2004 - 2007* Doctoral dissertation, University of Bristol, Bristol: UK.

Kim, K.S. and R.J.W. (2007). *Implementation system and snalysis methodologies of the preliminary feasibility studies*. Seoul, Korea Development Institute

Kwon, T.H. (2007). 'The limitation of AHP in the process of PFS'. *Journal of Korean public administration*: 1-14.

Kirp, D. (2004). 'When we "speak truth to power", does anyone listen?' *Policy matters*.

Ko, G.G. (2007). 'Multi-criteria public investment decision making and policy analysts' judgment: an analysis of weighting behavior.' *Journal of Korean public administration*, 16(1).

Koehler, D. J. and N. Harvey (2008). *Blackwell handbook of judgment and decision making*, Wiley. com.

Krueger, N.F. and D.V. Brazeal (1994). 'Entrepreneurial potential and potential entrepreneurs.' *Entrepreneurship theory and practice* 18, 91-91.

Laffont, J.-J. and D. Martimort (2009). *The theory of incentives: the principal-agent model*, Princeton University Press.

Laffont, J., Tirole,J. (1993). *A theory of incentives in procurement and regulation*. Cambridge, The MIT Press.

Lee, J. (2008). *Microeconomic theory*. Seoul, Bup Moon Sa.

Lee, J.K. (2006). *Research for the alternative on the evaluation system for the SOC projects*. E.R. Institute, Seoul.

Leskinen, P. (2000). 'Measurement scales and scale independence in the analytic hierarchy process.' *Journal of multi-criteria decision analysis*, 9(4): 163-174.

Lichfield, K. and Whitbread. (1975) *Evaluation in the Planning Process*, Oxford: Pergamon Press.

Lindblom, C. E. and Cohen, D. (1979) *Usable Knowledge*, Yale University Press, Yale.

Lindblom, C.E. (1986). 'Who needs what social research for policymaking?' *Science communication*, 7(4): 345-366.

Lipsey, R. G., et al. (1995). *An introduction to positive economics*, Oxford University Press.

Lootsma, F. (1993). "Scale sensitivity in the multiplicative AHP and SMART." *Journal of Multi-Criteria Decision Analysis* **2**(2): 87-110.

Lund, J. R. and R. N. Palmer (1986). "Subjective evaluation: Linguistic scales in pairwise comparison methods." *Civil Engineering Systems* **3**(4): 182-186.

Lynn, L. E. (1999). "A place at the table: Policy analysis, its postpositive critics, and future of practice." *Journal of Policy Analysis and Management* **18**(3): 411-425.

Ma, D. and X. Zheng (1991). *9/9±9/1 scale method of AHP*. Proceedings of the 2nd International Symposium on the AHP.

MacCoun, R. J. (1998). 'Biases in the interpretation and use of research results.' *Annual review of psychology*, 49(1): 259-287.

Marshall, E.C. and D.J. Spiegelhalter (1998). 'Reliability of league tables of in vitro fertilisation clinics: retrospective analysis of live birth rates.' BMJ: *British medical journal*, 316(7146): 1701.

McLean, I., et al. (2007). "The perils and pitfalls of performance measurement: The CPA regime for local authorities in England." *Public Money and Management* **27**(2): 111-118.

Melkers, J.E. and K.G. Willoughby (2001). 'Budgeters' views of state performance-budgeting systems: distinctions across branches.' *Public administration review*, 61(1): 54-64.

Meltsner, A.J. (1976). *Policy analysis in the bureaucracy*. University of California Press.

Miles, M.B. and A.M. Huberman (1994). *Qualitative data analysis: an expanded sourcebook*. London, Sage.

Millerson, G. (2013). *Lighting for TV and Film*, CRC Press.

Moe, T.M. (1987). 'An assessment of the positive theory of'congressional dominance.' *Legislative studies quarterly*: 475-520.

MPB (2003a). *The annual guidances for budget request*. Korean Ministry of Planning and Budgeting

MPB (2003b). *The guidance for preliminary feasibility study*. Korean Ministry of Planning and Budgeting.

MPB (2004a). *The annual guidances for budget request*. Korean Ministry of Planning and Budgeting

MPB (2004b). *The guidance for preliminary feasibility study*. Korean Ministry of Planning and Budgeting.

MPB (2005a). *The annual guidances for budget request*. Korean Ministry of Planning and Budgeting

MPB (2005b). *The guidance for preliminary feasibility study*. Korean Ministry of Planning and Budgeting.

MPB (2006a). *The annual guidances for budget request*. Korean Ministry of Planning and Budgeting

MPB (2006b). *The guidance for preliminary feasibility study*. Korean Ministry of Planning and Budgeting.

MPB (2007a). *The annual guidances for budget request*. Korean Ministry of Planning and Budgeting

MPB (2007b). *The guidance for preliminary feasibility study*. Korean Ministry of Planning and Budgeting.

MOSF (2008a). *The annual guidances for budget request*. Korean Ministry of Strategy and Financ

MOSF (2008b). *The guidance for preliminary feasibility study*. Korean Ministry of Strategy and Finance.

MOSF (2009a). *The annual guidances for budget request*. Korean Ministry of Strategy and Financ

MOSF (2009b). *The guidance for preliminary feasibility study*. Korean Ministry of Strategy and Finance.

MOSF (2010a). *The annual guidances for budget request*. Korean Ministry of Strategy and Financ

MOSF (2010b). *The guidance for preliminary feasibility study*. Korean Ministry of Strategy and Finance.

MOSF (2011a). *The annual guidances for budget request*. Korean Ministry of Strategy and Financ

MOSF (2011b). *The guidance for preliminary feasibility study*. Korean Ministry of Strategy and Finance.

MOSF (2012a). *The annual guidances for budget request*. Korean Ministry of Strategy and Finance

MOSF (2012b). *The guidance for preliminary feasibility study*. Korean Ministry of Strategy and Finance.

MOSF (2013a). *Annual guidance for budget requests*. Korean Ministry of Strategy and Finance

MOSF (2013b). *The guidance for preliminary feasibility study*. Korean Ministry of Strategy and Finance.

Namgung, G. (2011). *Research method for administration*. Seoul, Buebmoongak.

Norcross, E. and J. Adamson (2006). 'An analysis of the Office of Management and Budget's Program Assessment Rating Tool (PART) for Fiscal Year 2008.' Government Accou-ntability Project at the Mercatus Center at George Mason University.

Nutley, S., et al. (2002). "Evidence based policy and practice: cross sector lessons from the UK." *ESRC UK Centre for evidence basedpolicy and practice: working paper* **9**.

Nutley, S. M., et al. (2000). *What works?: Evidence-based policy and practice in public services*, The Policy Press.

O'Sullivan, E., et al. (2008). *Research methods for public administrators*. New York, Longman.

Park, H. (2007). *Preliminary feasibility study (PFS): performance and challenges*. Seoul, Korea Development Institute.

Park, J.W. (2012). *Nvivo 10*. Pusan, Pukyong National University Press.

Park, N. (2005). *A study of performance management and the introduction of economic incentive in the public sector*. Seoul, Korea Institute of Public Finance.

Park, N. (2008). *Does more information improve budget allocation? Evidence and lessions from performance-oriented budgeting in Korea*. . Working paper to be presented at the congress of the International Institute of Public Finance Maastricht: The Netherlands.

Patton, C.V. and D.S. Sawicki (1993). 'Basic methods of policy analysis and planning.'

Pe, E.C. (2007). *Decision-making for major infrastruture investment* T.K.T. Institute.

Perrin, B. (2002). *Implementing the vision: addressing challenges to results-focused management and budgeting*. Meeting on Implementation Challenges in Results Focused Management and Budgeting.

Pollitt, C. (1999). *Integrating financial management and performance management*. OECD.

Pratt, J.W. and R.J. Zeckhauser (1985). 'Principals and agents: an overview.' *Principals and agents: The structure of business*, 1: 12-15.

Rogoff, K. (1985). "The optimal degree of commitment to an intermediate monetary target." *The Quarterly Journal of Economics* **100**(4): 1169-1189.

Ross, S.A. (1973). 'The economic theory of agency: he principal's problem.' *The American economic review*, 63(2): 134-139.

Rossi, R.J. (2009). *Applied biostatistics for the health sciences*, Wiley. com.

Rubin, A. and E.R. Babbie (2008). *Research methods for social work*. Thomson Brooks/Cole.

Ruspini, E. (2000). 'Longitudinal research in the social sciences.' *Social research update*, 28(20): 1-8.

Saaty, T.L. (1977). 'A scaling method for priorities in hierarchical structures.' *Journal of mathematical psychology*, 15(3): 234-281.

Saaty, T.L. (1980). 'The analytic hierarchy process: planning, priority setting, resources allocation.' McGraw-H ill.

Saaty, T.L. (1990). 'How to make a decision: the analytic hierarchy process.' *European journal of operational research*, 48(1): 9-26.

Saaty, T.L. (2008). "Decision making with the analytic hierarchy process." *International Journal of Services Sciences* **1**(1): 83-98.

Salo, A.A. and R.P.Hamalainen (1997). 'On the measurement of preferences in the analytic hierarchy process.' *Journal of multi-criteria decision analysis*, 6(6): 309-319.

Sato, K. (2007). *Feasibility studies under the system for evaluating government polices inJjapan*.

Schoner, B. and W.C. Wedley (1989). *Alternative scales in AHP. Improving decision making in organisations*. Springer**:** 345-354.

Schmoldt, D. L. (2001). The analytic hierarchy process in natural resource and environmental decision making, Springer.

Shepperd, J.A., et al. (2002). 'Exploring the causes of comparative optimism.' *Psychologica Belgica*, 42(1/2): 65-98.

Shin, S. (2013). *Dysfunctional consequences of the Korean performance budgeting system and their policy implications*. Doctoral dissertation, University of Birmingham, Birmingham: UK.

Shulock, N. (1999). 'The paradox of policy analysis: if it is not used, why do we produce so much of it?' *Journal of policy analysis and management*, 18(2): 226-244.

Slovic, P. and B. Fischhoff (1977). 'On the psychology of experimental surprises.' *Journal of experimental psychology: human perception and performance***,** 3(4): 544.

Spulber, D.F. (1994). 'Economic analysis and management strategy: a survey continued.' *Journal of economics & management strategy*, 3(2): 355-406.

Straussman, J. (1976). "Technocratic counsel and societal guidance." *Politics and the future of industrial society. New York: David McKay.*

Sugden, R. (2010). *Citizens, consumers and clients: Alan Williams and the political economy of cost-benefit analysis.*

Sutton, S.R. (1999). 'How accurate are smokers' perceptions of risk?' *Health, risk & society* 1(2): 223-230.

Tong, R. (1986). *Ethics in policy analysis*. Englewood Cliffs, NJ, Prentice Hall

True, J. L. (2000). "Avalanches and Incrementalism Making Policy and Budgets in the United States." *The American Review of Public Administration* **30**(1): 3-18.

Ukeles, J. B. (1977). "Policy analysis: Myth or reality?" *Public Administration Review*: 223-228.

Vining, A., et al. (2001). Cost-Benefit Analysis: Concepts and Practice, New York: Prentice-Hall Publishing.

Waterman, R.W. and K.J. Meier (1998). 'Principal-agent models: an expansion?' *Journal of public administration research and theory*, 8(2): 173-202.

Weimer, D. L. (2002). 'Enriching public discourse: policy analysis in representative democracies'. *The good society*, 11(1): 61-65.

Weimer, D.L. and A.R. Vining (2005). 'Policy analysis: concepts and practice.'

Weiss, C.H. (1980). 'Knowledge creep and decision accretion.' *Science communication*, 1(3): 381-404.

Wildavsky, A.B. (1964). *The politics of the budgetary process*. Boston, Little, Brown.

Wildavsky, A. (1974) The Politics of the Budgetary Process. Boston: Little Brown.

Wildavsky, A. B. (1980). *The art and craft of policy analysis,* Macmillan London.

Wildavsky, A.B. and N.Caiden (1988). *The new politics of the budgetary process*. Glenview IL, Scott, Foresman.

Williams, W. (1971). *Social policy research and analysis: the experience in the federal social agencies*. American Elsevier Publishing Company.

Wilson, J.Q. (1989). *Bureaucracy*. Basic Books.

Wooldridge, J.M. (2003). *Introductory econometrics: a modern approach*. South-Western Pub.

Yin, R.K. (2008). *Case study research: design and methods.* London, Sage.

Yoon, S. (2001). *Government and Budget.* Seoul, Dae Young Sa.