

# Perceptions of success in performance-based procurement

## Differences between clients and contractors

Performance-based  
procurement

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### Abstract

**Purpose** – The purpose of this study is to analyse, from the perspective of agency theory, differences between client and contractor in their perceptions of changes in uncertainty and in inclination to opportunistic behaviour while using a performance-based procurement procedure. In agency theory, dealing appropriately with the uncertainty and opportunism that results from information asymmetry is an essential precondition for successful procurement.

**Design/methodology/approach** – The procurement procedure analysed is the Performance Information Procurement System (PiPS). PiPS is a performance-based procurement method that uses historic performance information to select the expected best performing contractor. In a theoretical model, a PiPS is interpreted as a set of contractual and organisational safeguards. Through a survey, based on this model, the perceived effects of the PiPS safeguards for both clients and contractors are investigated.

**Findings** – Both clients and contractors believe that applying PiPS introduces safeguards that reduce transaction uncertainty. The perceived changes in the discouragement to use opportunistic behaviour when using PiPS differ between client and contractor. Clients do not know and contractors are sceptical as to whether applying PiPS discourages opportunistic behaviour. This difference in perceptions can be explained by the often-traditional background of the two parties' project teams and the existence of information asymmetry.

**Originality/value** – This is one of the first studies to show that changes in the transaction environment in a performance-based procurement process are perceived differently by the client and the contractor. It is necessary to align the roles of both parties to avoid problems related to opportunistic behaviour.

**Keywords** Performance, Perception, Procurement, Opportunistic behaviour, Safeguards, Transaction

**Paper type** Research paper

### Introduction

In recent decades, construction projects have become progressively more complex (Walker, 2007):

- they are becoming larger;
- qualitative demands are increasing (for example in terms of sustainability);
- time pressures are growing;



- demands to restrict congestion and nuisance are getting louder;
- public expenses are watched more closely and, because of new developments, it is increasingly difficult to foresee all the possible solutions to a problem (Alderman *et al.*, 2005; Williamson, 1999).

In a situation where it is hard to determine the best technical solution or to foresee contingencies, it becomes useful for clients to involve contractors early in the construction process. In a complex project, interactions between client and contractor are needed to handle risks and contingencies (Laan *et al.*, 2011).

It is in this context, the clients have started to implement procurement procedures that reflect the need to anticipate contingencies and to reduce renegotiations in the construction stage by focussing on the alignment of goals and risks between client and contractor. Procurement processes are changing through the use of a range of procedures (from bidding to prescribed conditions in the case of regular projects to the use of interactive procedures where there is complexity), the allocation of risks (from allocating risks to one party to sharing risks over contingencies) and contract awarding methods (performance-based selection as opposed to price-based selection).

Many studies have been conducted on the effects of these performance-based procurement forms (Akinsola *et al.*, 1997; Barrett, 2007; Chua *et al.*, 1999; Dainty *et al.*, 2001; Eriksson and Pesamaa, 2007; Walker and Vines, 2000). However, less attention has been devoted to differences between client and contractor in their perceptions of these forms of procurement. Thereby, there is a need to evaluate these perceptual differences. This study addresses this need by investigating the differences in the parties' perceptions of success in the use of a performance-based procurement procedure from the perspective of agency theory. This theory analyses the relationship between a principal and an agent who makes decisions on behalf of that principal (Douma and Schreuder, 2008). In this theory, dealing appropriately with the uncertainty and opportunism resulting from information asymmetry is an essential precondition for successful procurement (Lane, 2001). The objective of this study is to analyse differences between client and contractor in their perceptions of changes in uncertainty and in inclination to opportunistic behaviour while using a performance-based procurement procedure.

The procurement method analysed here is Performance Information Procurement System (PiPS). PiPS aims to separate high from low performers and to reduce client risk. The major question to answer is how PiPS, as a procurement procedure that stresses goal alignment between client and contractor, effects the perceived transaction uncertainty and the inclination to opportunism by each party. To achieve this, the various aspects of PiPS are viewed and analysed as a set of contractual and organisational safeguards. A safeguard is seen as a mechanism that decreases the inclination to adopt opportunistic behaviour and/or reduces uncertainty (Williamson, 1985). Differences between the client's and the contractor's perceptions of changes when using PiPS are investigated in terms of differences in:

- the perceived reduction in uncertainty; and
- the perceived discouragement of opportunistic behaviour.

Using the agency theory as the theoretical lens, this study follows an economic approach to the structuring and managing of contract relationships (Van Slyke, 2006). Agency theory is based on the "model of man" that emphasises a self-interested actor who searches in a rational manner for maximisation of gain (Donaldson and Davis, 1991). Agency theory is one

of the theories of new institutional economics. New institutional economics is an economic perspective that attempts to extend economics by focussing on the social and legal norms and rules that underlie economic activity (Williamson, 2000).

Because PiPS is a performance-based procurement procedure and a number of elements of PiPS have been utilised for many years, the focus of this study is therefore on the performance-based aspects instead of the innovativeness of PiPS. First, the elements of the PiPS method are presented first. Following this, based on agency theory, a conceptual model is developed to explain the reduction in transaction uncertainty and in the inclination towards opportunism through interpreting PiPS as a set of safeguards. Subsequently, the design of a survey that will be applied among clients and contractors involved in procuring construction projects is elaborated on. The results of the applied survey are then presented and subsequently analysed. Finally, conclusions are drawn.

### Performance information procurement system

This section explains the basic philosophy and the different steps involved in the PiPS method for procuring a construction project. PiPS is a procurement method that aims to select the most suitable contractor and to spur this contractor towards achieving the highest possible performance while, at the same time, reducing the client's management and control tasks (Kashiwagi and Byfield, 2002; Kashiwagi *et al.*, 2004).

In selecting the best contractor, the PiPS method treats historic performance (the first P in PiPS) as an important indicator in assessing whether a contractor is likely to be successful. The next key element is information (the "i" in PiPS) and involves systematically gathering and processing information. In the first place, potential contractors must provide information about past performance that shows their ability to meet the functionalities specified in defined criteria. Further, once the project goes ahead, information gathering and processing become key to controlling performance. Next comes procurement (the second P), which involves selecting and contracting the most suitable party, and this should take account of the price-performance ratio. Finally, the "S" refers to this structured staged approach (the "system") that leads to the selection of a contractor based on careful consideration of both performance and cost.

As such, the PiPS approach involves four distinct stages (pre-qualification, selection, clarification and execution), each of which may contain one or more aspects (Kashiwagi *et al.*, 2004). This approach aims to separate high from low performers and to reduce client risk. Some aspects are used to select the best contractor; others are related to project control. The four stages and aspects commonly taken into consideration when procuring a construction project through this approach are as shown in Figure 1.

The pre-qualification stage aims to create the starting framework for the tender. This stage consists of the following aspects:

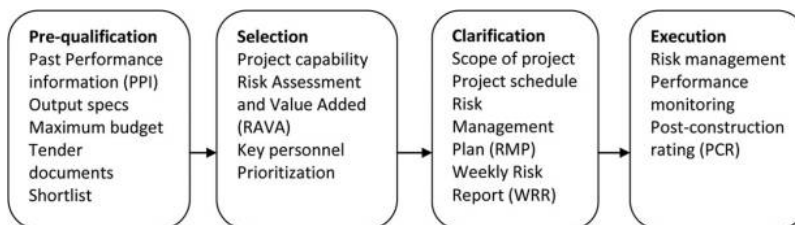


Figure 1.  
The PiPS process

- *Past performance information:* Information on contractors' past performance is collected and used. Clients rate the performance of contractors based on whether they have previously delivered on time, within budget and met the client's expectations.
- *Output specifications:* The project has to be defined in terms of output specifications, and contractors are challenged to deliver "fit for purpose" solutions.
- *Maximum budget:* Contractors are given an indication of the maximum budget for the required functionalities, and are challenged to maximise value for money.
- *Tender documents:* Developed to provide transparent insights into the tendering process, especially into the way contractors' solutions will be assessed.
- *Shortlist:* When applying a restricted procedure, the client has to develop a shortlist of contractors who can potentially meet the demands of the project.

The outcome of this stage is a clear starting point of what would constitute the "best value" tender.

Next, the selection stage focusses on selecting contractors with a good likelihood of successfully concluding the project. This stage has various selection criteria or "filters" to select the best contractor:

- *Project capability:* Information provided by the contractor on their capabilities to execute the project in terms of risk assessment, value added and costs. In risk assessment plans and risk assessment value added approaches, contractors have to indicate the project risks as they see them, and explain how they will minimise and manage these risks. Contractors are also challenged to suggest optimisations that add value to the project.
- *Interviews:* Key personnel and project managers are interviewed and assessed on their insights into the project, their experience, their ability to cooperate and their project management and communication skills.
- *Assessment and prioritisation:* Once all quality aspects have been assessed, price information is linked to the quality assessment results (commonly in a 30–70 price–quality ratio).

In this selection phase, the various selection criteria are weighted to ensure that the project's requirements are met. After the interviews, the proposals from the potential contractors are prioritised based on this set of weights and the ratings of the selection committee. The focus is on identifying the "best value" solution. A detailed check takes place – does the seemingly best bid appropriately meet all the output specifications and is the allocation of risks sufficiently elaborated? Provided the best-value contractor meets all the requirements, the process will enter the next phase, i.e. clarification.

In the clarification phase, the basis for the realisation of the project is developed. The intended contractor, having been considered to offer the best value, is asked to clarify its proposal in terms of the project scope. This should confirm whether the contractor's proposal is acceptable to the client and establish a clear view of the client's expectations through the client identifying areas of risk that they consider the contractor has not adequately addressed. Early in the clarification phase, the contractor is required to deliver documents that support its past performance statements in the tender documents. The result of this phase will be an offer to the client that includes the scope

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of the project, a project schedule, a list of risks, a risk management plan and an approved method for the weekly risk report (WRR). The offer should be comprehensible and the contractor should be able to deliver it at minimum risk. If this process fails, the next best best-value contractor will be asked to enter a clarification period.

Finally, in the execution stage, the contractor is in charge. During this stage, the main focus is on the management of risks through the WRR and the Director's Report. Here, the major activities are:

- *Performance monitoring*: The contractor monitors its own performance during the construction stage and reports on a weekly basis. Here, a weekly "risk number" can be used to show whether the project is progressing in line with the set targets.
- *Post-construction rating*: Once the project is delivered, the client determines a final score. The contractor's post-construction rating will influence the likelihood of winning future contracts.

PiPS can be described as a predominantly information-based system that predicts performance based on past performance information. It uses past performance information on contractors in selecting the one that is expected to perform best and to predict the outcome of a project. It is effectively a process to rank contractors and then select the best based on past performance, current capability, price, risk management and the quality of key personnel.

### A conceptual model

This study uses concepts drawn from agency theory to provide insights into the mechanisms within PiPS that change perceptions of uncertainty and inclination to opportunism by clients and contractors. Agency theory analyses the relationship between a principal and an agent who makes decisions on behalf of that principal (Douma and Schreuder, 2008; Jensen and Meckling, 1976). The agent, in turn, receives some form of payment or reward from the principal. The central problems perceived in agency theory are the conflict in goals between the principal and the agent and the expectation that, in general, agents have more information than principals. Conceptually, agents can exploit this information advantage for self-gain rather than fulfilling the interests of the principal. The focus of agency theory thus lies on this information asymmetry and the possibility it provides for opportunism (Arrow, 1984; Eisenhardt, 1989).

In the construction sector, the opportunities for opportunism resulting from a focus on achieving a low price, as well as the unbalanced division of risks in traditional contracts, is regularly seen as a major cause of the deteriorating relationships frequently observed between client and contractor organisations. In traditional contracts, most of the project risks are borne by the client, which places the contractor in a relatively comfortable position when problems arise. Client organisations face the risk of entering a contract based on a low bid price followed by claims for extra work and quality-shirking by the contractor.

Given the uncertainty resulting from information asymmetry and the possibility of opportunistic behaviour, resources will be spent on contractual and organisational *safeguards*. A safeguard is seen as a mechanism that decreases the inclination towards opportunistic behaviour and/or reduces the level of uncertainty. The purpose of safeguards is to provide, at minimum cost, the control and "trust" necessary for actors to

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believe that they will benefit from engaging in an exchange (Williamson, 1985). Our theoretical model assumes that PiPS is successful because, as outlined in Table I, it includes several safeguards that reduce transaction uncertainty and discourage opportunistic behaviour. The backgrounds to these safeguarding mechanisms are discussed below.

Agency theory argues that it is difficult for a principal to know exactly what an agent is doing and whether they are acting in the best interests of the principal (Eisenhardt, 1989; Davis *et al.*, 1997). In the terminology of agency theory, PiPS organises the tendering process and the project's management to ensure that the agent acts in the best interest of the principal. Several mechanisms can be used by the principal to reduce agency problems:

- The principal can delegate some of its rights or decision power to the agent, which can increase the likelihood of the agent taking decisions that benefit the principal. Outcome-based contracts can motivate an agent to align its preferences with those of the principal but at the price of the risks transferred to the agent. Output measurement contains more risk for the agent (and environmental aspects also play a role in meeting output goals), who will therefore seek compensation in the form of a higher reward.
- Aligning the goals of the client and the contractor makes behaviour more predictable and more cooperative. Where there is greater trust, the inclination to opportunist behaviour decreases, along with the need to control the agent's efforts (monitoring in terms of agency theory), and there is a better basis for cooperation.

The use of PiPS reduces uncertainty because contractors have to demonstrate their capabilities in executing the project. In terms of agency theory, this is related to *bonding*: the agent proves its own efforts. Facts and figures are available that reflect the project's objectives and support result-oriented project management. Contractors can distinguish themselves based on quality rather than just cost. This enhanced quality focus influences the competition and reduces risks and failure costs. In a PiPS project, contractors can suggest solutions at an early stage. Acquiring a reputation for good performance (past and current) motivates contractors to deliver on time and within budget. The better prepared and experienced a contractor, the lower is the likelihood of unforeseen events and subsequent uncertainty. The early sharing of information about the maximum budget with participants reduces the risk of overly expensive solutions. The information that contractors provide on risks indicates how they will manage these risks and this reduces uncertainty and information asymmetry.

Contractors know that, when the PiPS approach is being used, the price only counts for about 30 per cent and quality the remaining 70 per cent when tenders are assessed. Various selection criteria are weighted to ensure that the requirements of the project are met. Given the mix of selection criteria, contractors are aware that a good solution at a higher price can successfully compete with cheaper solutions. This means they can include reasonable margins, use quality materials and good workmanship. An acceptable profit can be made, and this reduces the inclination to act opportunistically. Contractors can develop their own solutions, rather than using solutions forced upon them by others, and this results in a stronger commitment, which again discourages opportunism. Sharing information on the maximum available budget with contractors allows them to maximise value for money by seeking solutions that provide the best fit

| PIPS safeguards  | Reduction in transaction uncertainty   | Discouragement of opportunistic behaviour   |
|--|--|---|
| Functional specifications                                    | Reduces demand uncertainty   | Discourages the tendency to exhibit opportunistic behaviour because the contractor now focusses on the how question and is responsible for the functional specifications  |
| Information regarding the maximum budget                     | Reduces invalid project proposals  | Discourages attempts to increase costs by claiming for extra work   |
| PPI  | Parties are only selected if they have performed well in the past on generally recognised criteria for success. This reduces market uncertainty and increases confidence that the project will be finished on time within budget | The reputation mechanism ensures that participants will not want to compromise their good name. This also reduces transaction uncertainty   |
| Risk assessment plans/risk assessment value added (RAP/RAVA) | RAP/RAVA separates "high performers" from "low performers". Timely attention to risk management translates into reduced market transaction uncertainty   | The reputation mechanism ensures that market participants will want to realise the expectations outlined in the RAP/RAVA  |
| Interview key personnel and project leaders                  | Assessing project leaders' competences reduces the risk of mismanagement, delays and quality constraints   | Identifying people and getting them involved during the early stage appeals to the reputation mechanism and also reduces transaction uncertainty  |
| Price-quality ratio  | Focussing on high quality triggers distinctiveness. Self-selection reduces the risk of incompetent participants and also reduces market uncertainty  | If contractors are ensured a reasonable margin then opportunistic behaviour should reduce   |
| (Pre-) award   | Adequate and transparent distribution of risks and alignment of goals reduces transaction uncertainty  | Transferring risks promotes the sense of responsibility and also reduces transaction uncertainty  |
| Hard performance data  | Performance data make the construction process transparent and efficient   | Because the predictability of the quality of the contractor increases during the selection process, both the need for monitoring during execution and the likelihood of opportunistic behaviour decrease  |
| Post-construction rating                                     | Given the reputation mechanism and opportunities for future work, the contracted party wants to be seen as a "high performer"  | Opportunistic behaviour does not fit a setting in which the interests of the client and the supplier are aligned. The contractor realises that quality today determines opportunities tomorrow. As a result, transaction uncertainty is reduced |

Table I.  
The PiPS safeguards

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between quality and budget if they know that quality is the dominant factor in the evaluation process.

It is generally assumed that using past performance information (PPI) contributes to the predictability of the tendering process and the project outcome. However, if the market environment has changed, past performance may not be a good predictor of future performance. Incorporating a contractor's past performance as a parameter in the bid evaluation process can also be subjective. Nevertheless, contractors are spurred on to continuously improve their image of delivering good quality workmanship, and opportunistic behaviour does not fit with such a mind-set.

## Research methodology

### *Survey operationalisation*

In this study, the perceived effects of the PiPS safeguards on transaction uncertainty and on the inclination to adopt opportunistic behaviour are investigated for both clients and contractors. Two separate questionnaires were developed: one aimed specifically at clients and the other at contractors. By using a survey approach, it was possible to quickly and efficiently acquire information from a large number of people. A major disadvantage is that the questions or statements can be misinterpreted (Singh, 2006). Both questionnaires start with questions relating to the background of the respondent and their experience with certain PiPS elements. Respondents were asked to rate the depth of their experience in terms of four categories: no experience, hardly any experience, reasonable experience or a great deal of experience.

Following these questions, respondents were asked to indicate to what extent they agreed with certain "if [...] then [...]" statements on a six-point scale: completely disagree (Score 1), disagree, somewhat disagree, somewhat agree, agree, strongly agree (Score 6). These statements address the investigated PiPS safeguards and their perceived influence on the level of uncertainty and opportunism. Examples of these statements are: "Using PiPS, I have more confidence in the contracted firm" and "Using PiPS, I experience less uncertainty about the cooperative attitude of the successful bidder". It was assumed that when a constructed variable scored 4 or above that this meant that the associated statement (linked to a PiPS safeguard) contributed to reducing transaction uncertainty or discouraging opportunistic behaviour. By using if/then statements respondents were asked to which extent a certain relation was to be *expected*. The focus was more on descriptive statistics rather than on testing the correlation between a dependent and an independent variable. The differences between parties' *perceptions* of the effects of PiPS are described. Before use, the questionnaire was assessed by four scholars, some experienced in survey methodology and others knowledgeable with respect to the elements of a PiPS. Subsequently, the questionnaire was tested in the field by five project managers to assure the relevance and comprehensibility of the statements and the appropriateness of the response scales.

### *Survey data collection*

The sample population consisted of project leaders involved in the procurement and/or execution of construction projects. Both stages were included because uncertainty and opportunism may play a role in and may be affected by the PiPS safeguards in both the *ex ante* and *ex post* contract phases. In building the client-side sample, the Dutch Highways Agency, an academic hospital and several large municipalities were



approached as these types of parties are known to be active in the field of performance-based procurement. The anticipation was that project managers in these organisations would be somewhat familiar with and have experience of certain elements of the PiPS procedure.

The client survey was initially targeted at 134 project managers. Nine of the addresses proved incorrect, or the addressees had changed jobs, so 125 project leaders on the client side were eventually asked to complete the survey. On the contractors' side, 97 project leaders were asked to complete the survey. The online survey for the client side resulted in 38 usable responses (30.4 per cent of the 125 respondents). On the contractors' side, 47 of the 97 invited project managers participated in the online survey (a response rate of 48.5 per cent). In both groups, the infrastructure sector dominated the responses (Table II). Both respondent groups were also dominated by participants with over 10 years of experience (Table III). Both the client and the contractor respondents were primarily active in the public sector (Table IV) and had predominantly technical (construction/civil-engineering related) backgrounds (Table V). Few had business and none had legal backgrounds.

### Survey data analysis

After the return of the completed questionnaires, a coding system was created where every question was allocated a numerical value for each answer category. Subsequently, the dataset using SPSS 14.0 was analysed. It was expected the responding contractors to

| Respondent groups | House building (%) | Office building (%) | Infrastructure (%) | Total (%) |
|-------------------|--------------------|---------------------|--------------------|-----------|
| Clients (38)      | 2                  | –                   | 98                 | 100       |
| Contractors (47)  | 9                  | 21                  | 70                 | 100       |

**Table II.**  
Sectoral distribution of respondents

| Respondent groups | ≤ 5 years (%) | 6-10 years (%) | 11-15 years (%) | ≥ 15 years (%) | Total (%) |
|-------------------|---------------|----------------|-----------------|----------------|-----------|
| Clients (38)      | 15            | 20             | 36              | 29             | 100       |
| Contractors (47)  | 6             | 9              | 30              | 55             | 100       |

**Table III.**  
Experience of the respondents

| Respondent groups | Public sector (%) | Private sector (%) | Total (%) |
|-------------------|-------------------|--------------------|-----------|
| Clients (38)      | 93                | 7                  | 100       |
| Contractors (47)  | 75                | 25                 | 100       |

**Table IV.**  
Distribution of respondents by sector

| Respondent groups | Engineering (%) | Business (%) | Law | Other (%) | Total (%) |
|-------------------|-----------------|--------------|-----|-----------|-----------|
| Clients (38)      | 71              | 17           | –   | 12        | 100       |
| Contractors (47)  | 90              | 9            | –   | 1         | 100       |

**Table V.**  
Professional background of the respondents

have considerable experience with PiPS, as they carry out projects for the client organisations that were identified. However, if those respondents with little experience scored similarly to those with a great deal of experience, this would mean that the research outcomes could be more generalisable than if there are clear differences between those with little experience and those with a great deal of experience (Sheskin, 2003). To examine this issue, *t*-test was conducted between two categories of respondents, those with little or no experience on the one hand and those with considerable experience on the other, with the reductions in transaction uncertainty and in opportunistic behaviour treated as independent variables. Here, the null hypothesis was that the means are equal, with the alternative hypothesis that the means significantly differ; *t*-tests with a 5 per cent level of significance were used. These tests provide insights into whether the respondents with little experience have significantly different perceptions to those with considerable experience.

**Survey results**

In this section, the focus is first on the survey results related to the experience respondents have with certain PiPS safeguards. Second, the scores from both the client and the contractor groups are compared for the perceived effects of PiPS safeguards on reducing transaction uncertainty and on reducing the inclination to adopt opportunistic behaviour. Finally, it was investigated whether experienced respondents perceive these effects differently from those with little or no experience.

*The level of experience with PiPS safeguards*

The first part of the survey focussed on the level of experience of respondents (Table VI) with certain PiPS safeguards. to find trends, two clusters were formed for each safeguard: one made up of those with little or no overall experience and the second of those with considerable experience.

Overall, both the principals and the contractors surveyed claimed similar levels of experience with eight of the nine PiPS safeguards. Only when it came to using PPI did the responses between the two “sides” differ significantly: only 20 per cent of the client respondents had significant experience with this safeguard compared with 55 per cent of contractors. A possible reason is that 25 per cent of the responding contractors

**Table VI.**  
Experience of  
respondents with  
PiPS safeguards

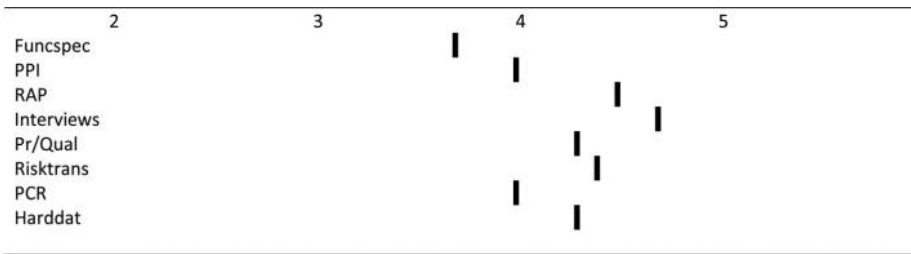
| PiPS safeguards | Clients                     |                                       | Contractors                 |                                       |
|-----------------|-----------------------------|---------------------------------------|-----------------------------|---------------------------------------|
|                 | No or hardly any experience | Reasonable or considerable experience | No or hardly any experience | Reasonable or considerable experience |
| Funcspec        | 44% (18)                    | 56% (23)                              | 59% (27)                    | 41% (19)                              |
| Budginf         | 88% (36)                    | 12% (5)                               | 89% (42)                    | 11% (5)                               |
| Ppi             | 80% (33)                    | 20% (8)                               | 45% (21)                    | 55% (26)                              |
| Rava            | 48% (19)                    | 52% (21)                              | 49% (23)                    | 51% (24)                              |
| Interviews      | 87% (35)                    | 13% (5)                               | 70% (33)                    | 30% (14)                              |
| Pr/qual         | 33% (13)                    | 67% (27)                              | 43% (20)                    | 57% (27)                              |
| Risktrans       | 38% (15)                    | 62% (24)                              | 52% (24)                    | 48% (23)                              |
| Harddat         | 68% (28)                    | 32% (13)                              | 80% (36)                    | 20% (9)                               |
| Pcr             | 88% (36)                    | 12% (5)                               | 94% (44)                    | 6% (3)                                |

(Table IV) primarily deal with private clients, whereas this category of client is hardly represented among the client sample, and that, in contrast to public clients, private clients make greater use of PPI safeguards.

Of the client respondents, 68 per cent indicated that they had little experience with managing projects using hard performance data. This is a remarkable finding, as several studies have shown that monitoring the construction process is essential to finish a project on time and within budget (Ang *et al.*, 2005). In addition, sharing of information in the tendering stage regarding the maximum available budget is still the exception rather than the rule. The same applies to giving weight to the quality of key project leaders, despite it being widely recognised that project leaders have a large influence on project progress (Waara, 2008). Despite this, this aspect is hardly taken into account when selecting a contractor.

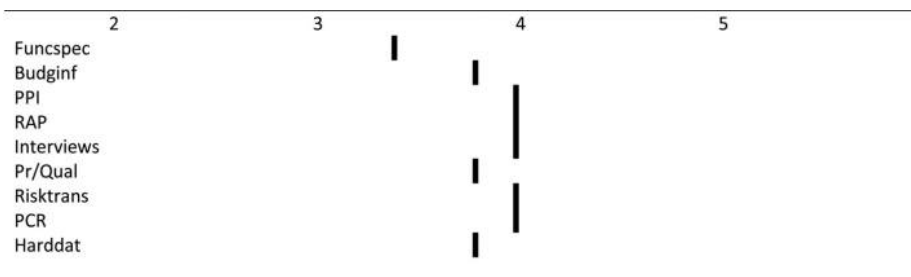
*The perceived effects of PiPS safeguards*

The scores of the respondents on the perceived effects of PiPS safeguards on reducing transaction uncertainty and on reducing the inclination to indulge in opportunistic behaviour are represented in Figures 2–5. The graphical representations presented in



**Figure 2.** Client scores on safeguards related to the reduction of uncertainty

**Notes:** Funcspec: functional specifications; PPI: past performance information; RAP: risk assessment plan; Interviews: interviews with key personnel and project managers; Pr/Qual: price-quality ratio; Risktrans: transparent distribution of risks; PCR: post-construction rating; Harddat: hard performance data



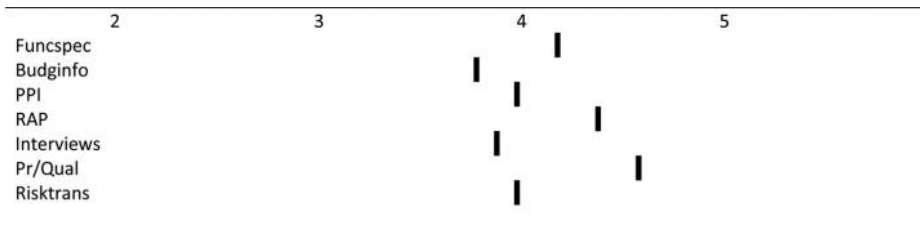
**Figure 3.** Client scores on safeguards related to the reduction of opportunism

**Notes:** Funcspec: functional specifications; Budginf: information regarding the maximum budget; PPI: past performance information; RAP: risk assessment plan; Interviews: interviews with key personnel and project managers; Pr/Qual: price-quality ratio; Risktrans: transparent distribution of risks; PCR: post-construction rating; Harddat: hard performance data

these four boxplots show the 25, 50 and 75 per cent quartiles. The left and right boundaries of the boxes indicate the 25 and 75 per cent cut-off values, and thus half of the respondents scored between these two values. The median score is shown by a double line. The area between the values of 4 and 6 contains the scores of all the respondents who believed the safeguard contributed to reducing uncertainty or curtailing opportunistic behaviour. Most notably, most respondents in Figures 2 and 4 fall within this area, whereas less than half do in Figures 3 and 5. Overall, most clients and most contractors did not believe that PiPS contributed to reducing opportunistic behaviour.

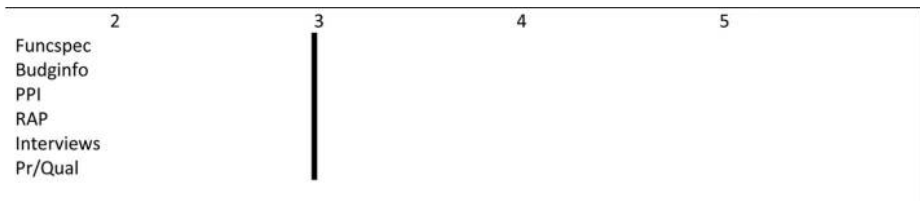
The scores of the client respondents on the perceived effects of PiPS safeguards on reducing transaction uncertainty and on reducing the inclination of contractors to indulge in opportunistic behaviour are shown in the boxplots in Figures 2 and 3. When focussing on the perceived effects of the PiPS safeguards on their own uncertainties, clients do not view the information sharing about the maximum budget (*budginf*) as reducing uncertainty (Figure 2). This is not surprising because this information has always been known to them and so they do not see this an added value of using PiPS. Further, when focussing on the perceived effects of PiPS safeguards on reducing contractors' opportunism, this safeguard, plus the price-quality ratio (*Pr/Qual*) and using hard data on performance (*harddat*) are not seen as reducing the level of opportunism (Figure 3). In both figures, the median scores for using functional specifications (*funcspec*) are also relatively low.

In Figures 4 and 5, the boxplots show how contractors perceive the effects of the PiPS safeguards on uncertainty and opportunism. When focussing on the effects of PiPS



**Figure 4.**  
Contractor scores on safeguards related to the reduction of uncertainty

**Notes:** Funcspec: functional specifications; Budginf: information regarding the maximum budget; PPI: past performance information; RAP: risk assessment plan; Interviews: interviews with key personnel and project managers; Pr/Qual: price-quality ratio; Risktrans: transparent distribution of risks



**Figure 5.**  
Contractor scores on safeguards related to the reduction of opportunism

**Notes:** Funcspec: functional specifications; Budginf: information regarding the maximum budget; PPI: past performance information; RAP: risk assessment plan; Interviews: interviews with key personnel and project managers; Pr/Qual: price-quality ratio

safeguards on their own uncertainty, contractors see the hard data performance (*harddat*) and post-construction rating (*PCR*) safeguards as irrelevant, as they already implicitly or explicitly know this information (Figure 4). Contractors do not view information about the maximum budget (*budginf*) and holding interviews (*interviews*) as reducing uncertainty. When focussing on the perceived effects of PiPS safeguards on reducing opportunism by clients, contractors did not, in general, see risk assessment plans (*rap*), hard data performance (*harddat*) and post-construction ratings (*PCR*) as useful (Figure 5). It seems that contractors assume that the availability of this information will not have an impact on whether and to what extent a client will act opportunistically. Further, one of these three safeguards, *PCR*, only has a role following construction and so it does not influence a client's behaviour during the project. Knowing the contractor's risk management abilities and having information about its performance during the construction stage will, in general, influence the client's behaviour, but there appears to be no direct relationship with the client's inclination to indulge in opportunistic behaviour.

Figures 2 and 3 show that nearly all the client respondents believe that most PiPS safeguards can *potentially* contribute to reducing uncertainty and discouraging opportunistic behaviour (with the exception of the *functspec* safeguard where the median value is 3.4 in Figure 3). Overall, the contractors felt that the PiPS elements potentially contribute to reducing uncertainty. However, the contractors, in giving somewhat ambivalent answers, did not generally believe that applying PiPS would reduce a client's inclination to use opportunistic behaviour. Looking at the distribution of the perceived effects of the various PiPS elements, the differences are minor. In the first three boxplots, most mean scores are between 3.5 and 4.5, and in the fourth boxplot most responses are between 3.0 and 4.0.

#### *Level of experience and the perceived effects of PiPS safeguards*

It is interesting to see whether respondents with considerable experience have different impressions to respondents with little or no experience. To examine this issue, *t*-test was conducted between two categories of respondents, those with little or no experience and those with considerable experience, with the reductions in transaction uncertainty and in opportunistic behaviour treated as independent variables. These tests provide insight into whether the answers of respondents with little experience differ significantly from those with considerable experience.

As Table VII shows, the effects of the PiPS on reducing opportunistic behaviours are not perceived as significantly different by client respondents with high and low levels of PiPS experience. In terms of perceptions regarding reducing uncertainty, there are only two statistically significant differences between the two groups, relating to the functional specifications and the transfer of risks safeguards. However, given the limited sample size, these results should be interpreted with caution. Overall, a clear link between the level of a client's experience with PiPS elements and their perceived effects in terms of reducing uncertainty and discouraging opportunistic behaviour was not demonstrated.

Table VIII shows that none of the differences when relating the level of a contractor's experience to the perceived effect of PiPS elements on reducing uncertainty is close to

**Table VII.**  
The experience of client respondents and the effects of PiPS safeguards

| Element   | Level of experience with PiPS    |   | p value<br>(p ≤ 0.05) |
|---|----------------------------------|---|-----------------------|
|   | No or hardly any experience Mean | Reasonable or a great deal of experience Mean |                       |
| <i>Perceived effects on the reduction of transaction uncertainty</i>      |                                  |   |                       |
| Funcspec  | 3.89 (18) <sup>a</sup>           | 3.38 (23)                                     | <b>0.032*</b>         |
| PPI   | 3.97 (32)                        | 4.07 (6)                                      | 0.759                 |
| RAVA  | 4.40 (17)                        | 4.37 (20)                                     | 0.905                 |
| Interviews  | 4.37 (32)                        | 4.63 (4)                                      | 0.618                 |
| Pr/Qual   | 4.46 (15)                        | 4.09 (24)                                     | 0.242                 |
| Risktrans   | 4.76 (15)                        | 4.07 (21)                                     | <b>0.043*</b>         |
| PCR   | 3.81 (33)                        | 3.96 (5)                                      | 0.760                 |
| Harddat   | 4.32 (27)                        | 4.33 (12)                                     | 0.962                 |
| <i>Perceived effects on the discouragement of opportunistic behaviour</i> |                                  |   |                       |
| Funcspec  | 3.80 (12)                        | 3.45 (19)                                     | 0.276                 |
| Budgetinf   | 3.62 (27)                        | 3.42 (3)                                      | 0.778                 |
| PPI   | 3.74 (21)                        | 3.97 (6)                                      | 0.581                 |
| RAVA  | 3.97 (16)                        | 3.88 (13)                                     | 0.811                 |
| Interviews  | 3.98 (25)                        | 4.38 (2)                                      | 0.498                 |
| Pr/Qual   | 3.95 (11)                        | 3.84 (19)                                     | 0.733                 |
| Risktrans   | 4.10 (13)                        | 4.10 (15)                                     | 0.989                 |
| PCR   | 4.18 (25)                        | 3.88 (4)                                      | 0.491                 |
| Harddat   | 3.83 (22)                        | 3.43 (7)                                      | 0.320                 |

**Notes:** <sup>a</sup>The numbers of scores (n) given; bold data indicates on which elements respondents with high and low levels of PiPS experience score statistically significant different; \*significant for p ≤ 0.05

**Table VIII.**  
The experience of contractor respondents and the perceived effects of PiPS safeguards

| Element   | Level of experience with PiPS    |   | p value<br>(p ≤ 0.05) |
|---|----------------------------------|---|-----------------------|
|   | No or hardly any experience mean | Reasonable or a great deal of experience mean |                       |
| <i>Perceived effects on the reduction of transaction uncertainty</i>      |                                  |   |                       |
| Funcspec  | 4.14 (27) <sup>a</sup>           | 4.15 (19)                                     | 0.959                 |
| Budgetinf   | 3.60 (42)                        | 3.25 (5)                                      | 0.474                 |
| PPI   | 4.03 (21)                        | 3.82 (26)                                     | 0.522                 |
| RAVA  | 4.44 (23)                        | 4.36 (24)                                     | 0.751                 |
| Interviews  | 3.58 (33)                        | 3.47 (14)                                     | 0.746                 |
| Pr/Qual   | 4.77 (20)                        | 4.66 (27)                                     | 0.559                 |
| Risktrans   | 4.21 (24)                        | 3.99 (23)                                     | 0.260                 |
| <i>Perceived effects on the discouragement of opportunistic behaviour</i> |                                  |   |                       |
| Funcspec  | 3.17 (27)                        | 2.97 (18)                                     | 0.297                 |
| Budgetinf   | 2.87 (41)                        | 3.10 (5)                                      | 0.485                 |
| PPI   | 3.62 (21)                        | 2.98 (25)                                     | <b>0.027*</b>         |
| Interviews  | 3.60 (33)                        | 3.45 (14)                                     | 0.633                 |
| Pr/Qual   | 3.25 (20)                        | 3.42 (26)                                     | 0.602                 |
| Risktrans   | 3.15 (24)                        | 3.32 (22)                                     | 0.469                 |

**Notes:** <sup>a</sup>The numbers of scores (n) given; bold data indicates on which elements respondents with high and low levels of PiPS experience score statistically significant different; \*significant for p ≤ 0.05

being statistically significant. In terms of reducing opportunism, only the perceived effect of past performance information is significantly different between the respondents with little and with considerable PiPS experience. Again, this table must be interpreted with some caution because of the low number of respondents.

The overall findings suggest that there is no clear and certainly no strong relationship between the level of experience and the perceived effects of PiPS elements on reducing uncertainty and discouraging opportunism.

## Analysis and interpretation

### *Client perspective on reducing uncertainty by using PiPS*

The client respondents largely agreed that the safeguards provided by using PiPS reduce uncertainty. The average score across all the relevant aspects was 4.07 (with lower and upper quartiles of 3.62 and 4.56, respectively) on a scale ranging from 1 to 6 (where 1 equates to totally disagreeing with the view that a safeguard prevents uncertainty and 6 to fully agreeing) (Appendix). The boxplot in Figure 2 reflects that the median scores for all the safeguards were at least 4.0 with the exception of functional specifications (*funcspec*). This means, at least according to the client respondents, that having a specification that contains a reasonable level of freedom (by being based on functional specifications) will not make a large contribution to reducing uncertainty. A possible explanation is that clients play down the value of functional specifications because they are reluctant to give freedom to contractors. This would be a substantial change from the traditional approach where detailed specifications are provided by the client. Having hard performance data (*harddat*) and taking account of the quality of key project managers were two aspects that scored highly. It is striking that while much was expected of these safeguards, they are not yet widely used.

The internal homogeneity of this set of questions was good with a Cronbach's  $\alpha$  of 0.834. Clients generally expect the elements of the PiPS to reduce uncertainty. This reduced uncertainty is manifested in the following ways (shown in descending order of the respondents' scores for each effect):

- greater confidence in the contracted firm (4.32);
- having more relevant information about the progress of the project and greater expectations that this can be predicted (4.31);
- less uncertainty about the cooperative attitude of the successful bidder (4.23);
- fewer concerns over unforeseen events (4.02);
- less uncertainty with regard to the contractual definition of what is agreed upon (3.97); and
- less uncertainty about the way in which the client has formulated the question (3.82).

### *Client perspective on discouraging opportunism by using PiPS*

Clients on the whole also believe that applying PiPS potentially discourages opportunistic behaviour. The average score across all the relevant aspects was 3.81 (Appendix). The strength of the agreement was however less strong than with reducing uncertainty, with all but one of the medians being between 3.5 and 4.0.

The internal homogeneity of this set of questions was again high with a Cronbach's  $\alpha$  of 0.931. Clients seem to expect the application of the PiPS elements to discourage

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opportunistic behaviours by contractors. Clients see this reduced inclination towards opportunism by contractors as related to the following aspects (shown in descending order of respondents' scores):

- greater room for initiative by the contracted firm (4.05);
- greater willingness by the contractor to resolve errors (3.94);
- deployment of better trained personnel (3.93);
- more cooperative behaviours by the contracted firm (3.91);
- more open and sincere attitudes by the contracted construction firm (3.85);
- decrease in claim-related behaviours (3.76);
- decrease in actively seeking opportunities to charge for extra work (3.73); and
- contractor less inclined to exploit defects in the specifications and conditions (3.53).

#### *Contractor perspective on reducing uncertainty by using PiPS*

The responding contractors endorsed the view that applying the PiPS elements reduces uncertainty. The average score for all seven related questions was 4.10 (lower and upper quartiles were 3.63 and 4.57, respectively) on the six-point scale described earlier. The median scores for all the questions were close to this mean (Figure 4). The median score furthest from the mean value was for "handling price and quality as a criterion" where the mean score was 4.60. The "risk assessment plan" aspect with a median score of 4.43 also scored relatively highly. With an overall Cronbach's  $\alpha$  of 0.757, the internal homogeneity of the scale is satisfactory. Two individual items have a Cronbach's  $\alpha$  below the normally acceptable level of 0.7. Increasing the homogeneity by excluding these two items does not, however, compensate for the loss of data. Contractors, on average, did not view having information about the maximum budget (*budginf*) and the interviewing process (*interviews*) as reducing uncertainty.

The interpretation put on these results is that contractors expect the application of PiPS, and particularly certain elements, to reduce uncertainty. This reduced uncertainty is primarily based on the following aspects (shown in descending order of respondents' scores):

- more possibilities to realise a healthy return (4.24);
- more confidence in the functioning of the project organisation (4.21);
- better able to respond to unforeseen events (4.16);
- greater confidence in a good outcome of the work (4.16);
- less uncertainty over required knowledge for the work (4.10);
- greater insight into opportunities within tenders (4.10); and
- less uncertainty with regard to assessing the work to be done (3.83).

#### *Contractor perspective on discouraging opportunism by using PiPS*

The contractor respondents were generally sceptical when it came to the extent that PiPS would reduce the inclination of clients to indulge in opportunistic behaviours. The average score for the six questions related to this was 3.17 (with lower and upper quartiles of 2.86 and 3.42, respectively) on the same six-point scale as used earlier. The



median score for each of the safeguards was 3. For the safeguards *funcspec*, PPI and *interviews*, the lower quartile scores were also 3 (Figure 5). Overall, these answers show that most of the contractors slightly disagreed with the proposition that applying a PiPS would discourage opportunistic behaviour by clients.

Within the sets of questions used, there are only two or three operationalisations of opportunistic behaviour, and, therefore, it is not possible to calculate a reliable Cronbach's  $\alpha$  for each question. The Cronbach's  $\alpha$  for the entire set is 0.840, which indicates that the overall measurement is valid. The responding contractors were sceptical as to whether applying PiPS discourages opportunistic behaviour by clients. In other words, they do not expect the use of PiPS to reduce clients' inclination to indulge in opportunistic behaviour. The most likely explanation is that contractors still expect clients to seek the lowest price. Additional research in this area is required.

Table IX summarises the extent to which respondents expect the various PiPS safeguards to reduce transaction uncertainty and discourage opportunistic behaviour. Both clients and contractors similarly perceive the overall effect of a PiPS as reducing uncertainty (the difference between them is not significant). However, clients are uncertain as to whether PiPS also reduces the tendency to opportunism by their contractor partners, while the responding contractors tended to think a PiPS does not reduce this tendency in clients.

## Conclusion

The survey results show that there are no differences between the two parties' perceptions of reductions in the uncertainty of the transaction environment. Both clients and contractors believe that applying PiPS introduces safeguards that reduce transaction uncertainty. The changed perception of uncertainty by both clients and contractors through using PiPS can be explained by the following mechanisms. First, during the procurement process, the client and the contractor align the project's goals and scope with the approach to be used in project execution. Pre-planning the project gives the client insight into the contractor's expertise and enables the client to oversee the project from start to final delivery. Contractors are involved at an early stage and have the opportunity to show their expertise. In the terms of agency theory, the agent is able to prove its own efforts through bonding. Further, in the PiPS approach, considerable attention is given to risk management and to allocating the project risks that will occur during execution to the party best able to manage them. Outcome-based contracts and transferring risk to the agent provide motivation for the agent to align its preferences with those of the principal.

The perceptions of changes in the discouragement of opportunistic behaviour when using PiPS differ between clients and contractors. Clients are uncertain as to whether the PiPS safeguards discourage opportunistic behaviour by contractors. Contractors are even more sceptical as to whether applying the PiPS approach

| Effect                  | Client                             | Contractor                            |
|-------------------------|------------------------------------|---------------------------------------|
| Transaction uncertainty | 4.07 (maximum 6.00) somewhat agree | 4.10 (maximum 6.00) somewhat agree    |
| Opportunistic behaviour | 3.81 (maximum 6.00) do not know    | 3.17 (maximum 6.00) somewhat disagree |

**Table IX.**  
Effects of PiPS safeguards

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discourages opportunistic behaviour by clients. A possible explanation for this difference between clients and contractors in the perceived discouragement of opportunistic behaviour is that because clients have for decades prescribed detailed specifications and then sought out the party that could realise the requested work at the lowest price, contractors are sceptical about clients changing their behaviour. In the PiPS approach, the client attempts to eliminate opportunistic behaviour by contractors by specifying product demands and pre-planning the project. If a client demands more details than originally envisioned and necessary before awarding the contract, this maybe reflects a natural tendency of the client to relapse into a more control-oriented management style instead of giving responsibility and autonomy to the contractor. The potential contractor meets the demands because the contract has not yet been awarded. As a consequence, the contractors sense that a control-oriented management style remains the basis of shaping and monitoring the principal-agent relationship in an effort to increase the probability that agents will behave in such a way that the objectives of the principal are realised (Eisenhardt, 1985, 1989; Flamholtz *et al.*, 1985).

From this survey, one can conclude that the changes in the transaction environment as a result of using a performance-based procurement procedure are perceived differently by clients and by contractors. While both sides believe that the PiPS approach reduces uncertainty, clients do not know and contractors are sceptical about there being any accompanying reduction in their partner's inclination to indulge in opportunistic behaviour. This difference in perceptions can be first explained by the often-traditional background of project teams and their lack of experience with performance-based procurement approaches which results in a tendency to revert to traditional control behaviour by the client. Second, even when using a PiPS approach, there remains information asymmetry between the client and the contractor, with the former having greater knowledge of the project and the latter of the technical expertise they can provide.

The major implication of this study relates to the roles of client and contractor. It is necessary to align these roles to avoid problems associated with reverting to traditional control behaviour. Where the new roles are not sufficiently understood, the control-oriented management style adopted by the client aggravates the contractor and their relationship. If, on the other hand, the roles are understood from the start, it becomes clear what to expect from each other during the process. Clear and aligned roles are expected to contribute to lowering uncertainty and reducing the inclination to opportunistic behaviour.

Second, it was seen that information asymmetry is decreased where the client facilitates the contractor by delivering the necessary information, and highlighting gaps in the elaboration of the bid and the pre-planning of the project. The role of the contractor should include being in the lead, being pro-active and unburdening the client.

Overall, it can be concluded that clients who strive for high project performance should make great efforts to reduce uncertainty and the inclination to behave opportunistically. If the uncertainty in the transaction environment is high, adversarial relationships may follow that end up in disagreement and conflict that directly contribute to higher transaction costs. The less the uncertainty, the lower

the inclination to behave opportunistically and the greater a project's success and performance.

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## Appendix

General values are listed in the following tables for client and contractor respondents respectively. In these tables the internal homogeneity of items per question are shown using the Cronbach's  $\alpha$ :

- $n$  is the number of respondents
- $\mu$  represents the average score
- $\sigma$  represents standard deviation
- 25 per cent first quartile, left of the median
- 50 per cent represents the median
- 75 per cent third quartile, right of the median

| Safeguard  | $n$ | $\mu$ | $\sigma$ | 25 (%) | 50 (%) | 75 (%) | $\alpha$           |
|------------|-----|-------|----------|--------|--------|--------|--------------------|
| Funcspec   | 41  | 3.61  | 0.770    | 3.17   | 3.67   | 4.08   | 0.696              |
| PPI        | 38  | 3.98  | 0.703    | 3.60   | 4.00   | 4.40   | 0.754              |
| RAVA       | 38  | 4.37  | 0.869    | 4.00   | 4.50   | 5.00   | 0.872              |
| Interviews | 37  | 4.39  | 0.944    | 3.88   | 4.75   | 5.00   | 0.924              |
| Pr/qual    | 38  | 4.22  | 0.899    | 3.67   | 4.33   | 5.00   | 0.950              |
| Risktrans  | 37  | 4.32  | 1.032    | 3.80   | 4.40   | 5.00   | 0.911              |
| PCR        | 38  | 3.83  | 0.989    | 3.15   | 4.00   | 4.40   | 0.902              |
| Harddat    | 39  | 4.32  | 0.739    | 3.67   | 4.33   | 5.00   | 0.650 <sup>a</sup> |
| Average    |     | 4.067 | 0.641    | 3.62   | 4.17   | 4.56   | 0.834              |
| Funcspec   | 31  | 3.59  | 0.852    | 3.00   | 3.40   | 4.20   | 0.794              |
| Budginf    | 30  | 3.60  | 1.155    | 3.00   | 3.75   | 4.31   | 0.939              |
| PPI        | 27  | 3.79  | 0.893    | 3.00   | 4.00   | 4.33   | 0.962              |
| RAVA       | 30  | 3.90  | 0.916    | 3.00   | 4.00   | 4.56   | 0.895              |
| Interviews | 28  | 3.99  | 0.765    | 3.50   | 4.00   | 4.50   | 0.926              |
| Pr/qual    | 30  | 3.88  | 0.847    | 3.40   | 3.83   | 4.54   | 0.933              |
| Risktrans  | 28  | 4.10  | 0.692    | 3.31   | 4.00   | 4.75   | 0.874              |
| PCR        | 29  | 4.14  | 0.803    | 3.41   | 4.00   | 5.00   | 0.951              |
| Harddat    | 29  | 3.73  | 0.905    | 3.00   | 3.83   | 4.17   | 0.942              |
| Average    |     | 3.81  | 0.673    | 3.30   | 3.80   | 4.30   | 0.931              |

**Notes:** <sup>a</sup> This item has a lower Cronbach's  $\alpha$  than the normally acceptable level of 0.7; increasing the homogeneity by excluding these two items does not compensate for the loss of data

**Table AI.**  
Client respondents

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| Safeguard  | <i>n</i> | $\mu$ | $\sigma$ | 25 (%) | 50 (%) | 75 (%) | $\alpha$           |
|------------|----------|-------|----------|--------|--------|--------|--------------------|
| Funcspec   | 47       | 4.15  | 0.842    | 3.67   | 4.17   | 4.83   | 0.788              |
| Budginf    | 47       | 3.56  | 1.006    | 2.75   | 3.75   | 4.25   | 0.839              |
| PPI        | 47       | 3.91  | 1.067    | 3.29   | 4.00   | 4.71   | 0.949              |
| RAVA       | 47       | 4.40  | 0.890    | 3.86   | 4.43   | 5.00   | 0.921              |
| Interviews | 46       | 3.87  | 0.917    | 3.29   | 3.92   | 4.71   | 0.893              |
| Pr/qual    | 47       | 4.71  | 0.634    | 4.40   | 4.60   | 5.00   | 0.658 <sup>a</sup> |
| Risktrans  | 47       | 4.10  | 0.645    | 3.83   | 4.00   | 4.50   | 0.589 <sup>a</sup> |
| Average    |          | 4.103 | 0.561    | 3.63   | 4.17   | 4.57   | 0.757 <sup>b</sup> |
| Funcspec   | 46       | 3.10  | 0.602    | 3.00   | 3.00   | 3.50   |                    |
| Budginf    | 46       | 2.89  | 0.699    | 2.50   | 3.00   | 3.50   |                    |
| PPI        | 46       | 3.27  | 0.987    | 3.00   | 3.00   | 4.00   |                    |
| Interviews | 46       | 3.16  | 0.961    | 2.50   | 3.00   | 4.00   |                    |
| Pr/Qual    | 46       | 3.35  | 1.100    | 3.00   | 3.00   | 4.00   |                    |
| Risktrans  | 46       | 3.23  | 0.763    | 2.67   | 3.00   | 3.67   |                    |
| Average    |          | 3.17  | 0.638    | 2.86   | 3.08   | 3.42   | 0.840              |

**Notes:** <sup>a</sup>These items have a lower Cronbach's  $\alpha$  than the normally acceptable level of 0.7; increasing the homogeneity by excluding these two items does not compensate for the loss of data; <sup>b</sup> number of items per question is too small to calculate individual  $\alpha$  per item; hence, here only the  $\alpha$  for the whole set of questions relating to the deterrence of opportunism is displayed

**Table AII.**  
Contractor  
respondents

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