

# **Past Performance Information: Analysis of the Optimization of a Performance Evaluation Criteria**

**Kenneth T. Sullivan, Ph.D., M.B.A. and John Savicky, M.S.**  
Performance Based Studies Research Group, Arizona State University  
Tempe, AZ, USA.

Performance information has been defined as “the set of metrics used to quantify both the efficiency and effectiveness of actions (Neely 1995).” From this definition, past performance information can be extrapolated to entail those metrics that consider the effectiveness of past or previous actions. Within value-based procurement methodologies, the use of past performance information as an evaluation criteria is common; however, the optimal use, method, specific criteria, and collection techniques vary widely across clients and buyers. This paper presents a history and evolution of the use of past performance information within a specific procurement and project delivery process called the Performance Information Procurement System (PIPS). It also includes an analysis of the modifications made, an analysis of the effort required for the inclusion of past performance information as a selection criteria as calculated from the procurer’s perspective, and an analysis of a new methodology of a vendor driven collection process as compared to a buyer driven collection process.

**Keywords:** performance information, value based selection, performance metrics, past performance information

## **Introduction**

The construction industry is under increasing pressure to improve its practices (Hill 1991), and is suffering from a lack of performance. “Performance management is a growing concept in construction and this is evidenced by the numerous methodologies and approaches to measuring that have recently been introduced (Lee 2000).” Within the construction industry the objective of performance information is to impact and improve construction performance (Kashiwagi 2008). Performance information has been defined as “the set of metrics used to quantify both the efficiency and effectiveness of actions (Neely 1995).” Key metrics that apply to performance information in the construction industry correspond to cost, schedule, and customer satisfaction. It is proposed that simply quantifying the effectiveness of a contractor or project is not effective. The data that is collected and measured must be used to affect change in either the client organization, the contractor, or in the project itself in order for it to be effective.

Performance information is a widely used research topic; however, very few publications have addressed this vital component. In a recent 2009 CIB Working Commission 117 report, it was found that after examining over 4500 academic articles on performance information, only four proposed systems were able to demonstrate the repeated use of performance information to motivate an increase in efficiency (Egbu et. al 2008). Of these four, only one dominantly demonstrated the use of performance information over an extensive range of repeated hypothesis testing, and this was the Best Value Performance Information Procurement System.

A key aspect of the Performance Information Procurement System (PIPS) is the incorporation of past performance information into the selection criteria for contractors, designers, and other services providers in bid and RFP processes. This paper traces the development, modifications, and future of the use of past performance information (PPI) within the PIPS process, showing the evolution and refinement of an idea to its most optimized state.

### History of Past Performance Information Modifications

Past performance information, or PPI, has undergone significant changes in the PIPS process throughout the past 14 years. The most substantial changes to the PPI process, which were implemented to increase the efficiency of the process for both the client and the vendor, are documented in Table 1.

Table 1

***Changes to the Past Performance Information (PPI) process***

No	Modification Made	Date
1	Requiring past performance information on key individuals	1999
2	Minimizing the need to physically inspect all past projects	2003
3	Creating a standard survey questionnaire and minimizing the number of criteria	2004
4	Requiring the vendor to create and send out survey forms to past clients	2004

*Requiring past performance information on key individuals*

Prior to 1999, the PPI process only required past performance information on the firm that was competing on a project. As the PBSRG increased their research in large general construction projects, it was discovered that the key individuals on the project played an extremely important role in the overall success of a project. In 1999, the PPI process was modified to allow clients an opportunity to collect past performance information on key individuals that would be assigned to their project. This included the project manager and site superintendent. The benefit of this modification was that the vendors would be encouraged to assign their best personnel on the project. This also allowed the PPI process to be a better indicator of future performance, since information was being collected on the actual individuals being assigned to the project.

*Minimizing the requirement to physically inspect all past projects*

Prior to 2003, the PPI process required the client to physically inspect all roofing projects to document the physical deterioration and performance of each roof. The challenges with performing this function included:

- It required a substantial amount of effort from the client (to physically inspect all of the roofs)
- It required a substantial amount of effort from the vendor (to coordinate the inspections and assist with the inspection process)

- It required effort from past clients

In 2003, the PPI process was modified to allow the client the option to:

- Randomly inspect a minimum number of roofs
- Inspect only the roofs of the shortlisted firms
- Inspect only the roofs of the firm selected for award

This modification results in a more efficient process for both the client (since they were not inspecting every roof) and the vendor (especially if they were not selected for award).

*Creating a standard survey questionnaire and minimizing the number of criteria*

Prior to 2003, the PPI process allowed the client to create a unique survey for every critical area that would be evaluated on a project. This was done to allow each client an opportunity to have control over specific questions that would be asked. On average, each survey contained 37 different questions relating to the performance of the vendor. Some areas had up to 3 pages of criteria, such as mechanical systems that asked 79 unique questions.

A growing concern with allowing this process to continue was:

- The survey forms were becoming very long.
- Compiling the survey data required a substantial amount of resources from the client (to enter and double-check data)
- The process increased work for the vendors, since they would have to re-survey past clients if a new user had alternative questions to be evaluated.

In 2003, a statistical analysis was performed on over 200 contractor databases (Kashiwagi and Parmar 2004). The results of this study were significant. The study showed that using eight criteria generated the same statistical results as asking up to 79 different questions, notwithstanding what technical field was being surveyed. The results of the analysis concluded that a standard questionnaire could be asked to all construction trades, and that the number of criteria could be minimized to eight.

In 2004, the PIPS process was modified to use a standard questionnaire on all construction trades using the 8 criteria identified in the statistical analysis. The results of this modification:

- Survey forms were short and succinct (one page)
- The efforts of past clients were minimized (evaluating only 8 questions instead of a minimum of 37)
- Client resources were minimized (to compile and double-check the data)
- Vendors were not required to re-survey past clients (due to modified owner criteria)

The eight criteria are:

1. Ability to manage the project cost.
2. Ability to maintain the project schedule.
3. Quality of Workmanship.

4. Professionalism and ability to manage.
5. Close out process.
6. Communication, explanation of risk, and documentation.
7. Ability to follow the users rules, regulations, and requirements.
8. Overall customer satisfaction and hiring again based on performance.

*Requiring the vendor to create and send out survey forms to past clients*

Prior to 2003, the PPI process only required the vendors to prepare a list of past projects to be surveyed. Once the list was prepared and submitted to the Client, the Client would be responsible for:

- Creating a survey questionnaire for each reference for each vendor
- Faxing out the survey questionnaire to the past client
- Calling to confirm that the survey questionnaire was received by the past client

Although this process required the least amount of effort from the vendors, it resulted in a great deal of work on the client's side. The client was forced to spend an enormous amount of resources in preparing and faxing out all surveys for all vendors. They were also expected to call each past client to verify that they received the survey (to prevent a vendor from protesting that the client did not send out their surveys). Lastly, they had to designate resources to carefully document the survey process for each vendor.

In 2004, a decision was made to place the vendors at risk for sending out their own surveys. The risk with this decision would be a claim that this would require too much effort from the vendor. However, the benefits of doing this outweighed the potential risk. By requiring the vendor to send out their own survey, the following occurred:

- Vendors could not protest that the client did not send out their surveys
- The client was not at risk if the vendor did not send out their surveys
- The client did not having to document whether the past client received the survey
- The client saved a substantial amount of time and resources in the entire process

### **Current PPI Process**

The current PPI process is shown in Figure 1 below. The process has 3 major steps, which will be discussed.

Step 1: The vendor prepares a reference list, which is a list of their best past projects. The vendors are instructed to not submit any low or bad projects. These projects do not have to be similar to the current project being procured. After the vendor prepares their reference list, they are required to send the list to the current client.

Step 2: The vendor prepares a survey questionnaire for each of their past clients. The vendor sends out the surveys to their past clients and requests that their previous clients return the survey to the current client as soon as possible.

Step 3: The current client prepares a database for each vendor. The database includes the reference list that the vendor submitted, and also contains the survey score responses from the past clients (the current client enters the survey data into the database). The current client then generates the vendors' average past performance score.

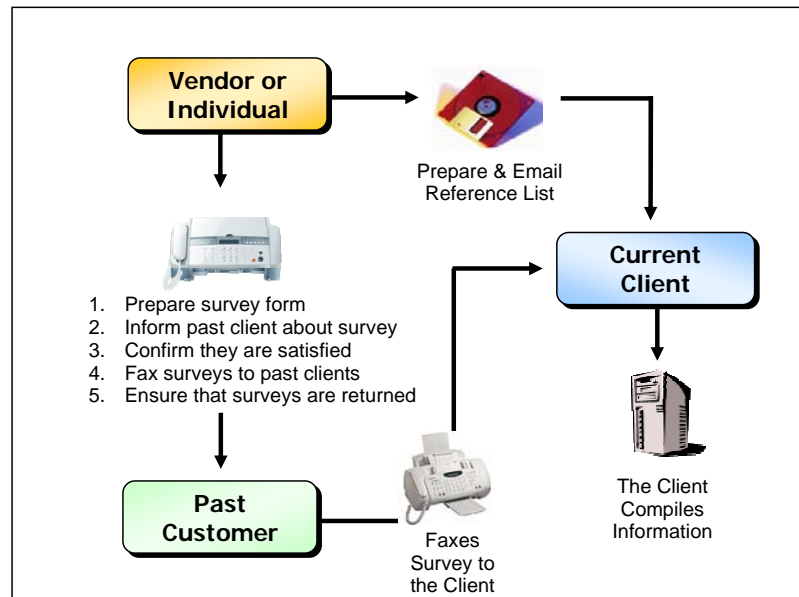


Figure 1: Current PPI Process

Although this process is more efficient than past processes, there are still potential improvements that can be made. The potential risks to the current system include:

- The overall score of each vendor may not be an accurate reflection of how well the firm performs (since the vendor is allowed to select only their best past projects)
- The process requires the vendors to spend resources in preparing and faxing out surveys
- The vendors do not know which past clients have turned in or submitted a survey.
- The process requires the client to spend resources tracking the surveys that have been returned and responding to the vendor's requests for information on surveys that have been submitted.
- The process requires the client to spend resources inputting all survey responses
- The process places the client at risk for accurately entering survey scores (which requires the client to double-check all entries)
- The vendor has no control if a past client gives them a low score

### City of Peoria PPI Analysis

The City of Peoria has been using the PIPS Best-Value process since 2004. During this time, the City has collected over 5,000 surveys on: Construction Firms (76), Design Firms (81), and Key Individuals (515).

An analysis was conducted in 2008 on the time spent on the PPI process (Table 2). These numbers were based on the estimated amount of time spent during a one-year period from June 2007 to June 2008. This included:

- The total number of surveys completed for all contractors, designers, and individuals.
- The total number of invalid surveys, which includes the number of surveys that were received that did not correlate to any existing reference list
- The total number of vendor requests for PPI information. This includes the time to obtain survey information, and survey results for the firm and critical individuals.

Table 2

***City of Peoria 2008 Analysis of Time Spent on the Past Performance Information (PPI) Process***

No	Criteria	Number	Average Time / Entry	Total Time
1	Total number of surveys entered	2,742	10 min	457 hrs
2	Number of invalid surveys	2,664	5 min	222 hrs
3	Number of vendor requests for information	482	25 min	201 hrs
Total Time Spent:				880 hrs

The results show that the City spent 880 hrs in compiling and maintaining the PPI databases over a one-year period. Assuming that the person entering all of this data makes \$25/hr (including all overhead costs), this equates to approximately \$22,000.

**Modified PPI Process**

To minimize the amount of resources needed to maintain the PPI databases, a modified process has been proposed. This process is similar to the current process, however, has a slight modification to increase efficiency. The process is shown below in Figure 2.

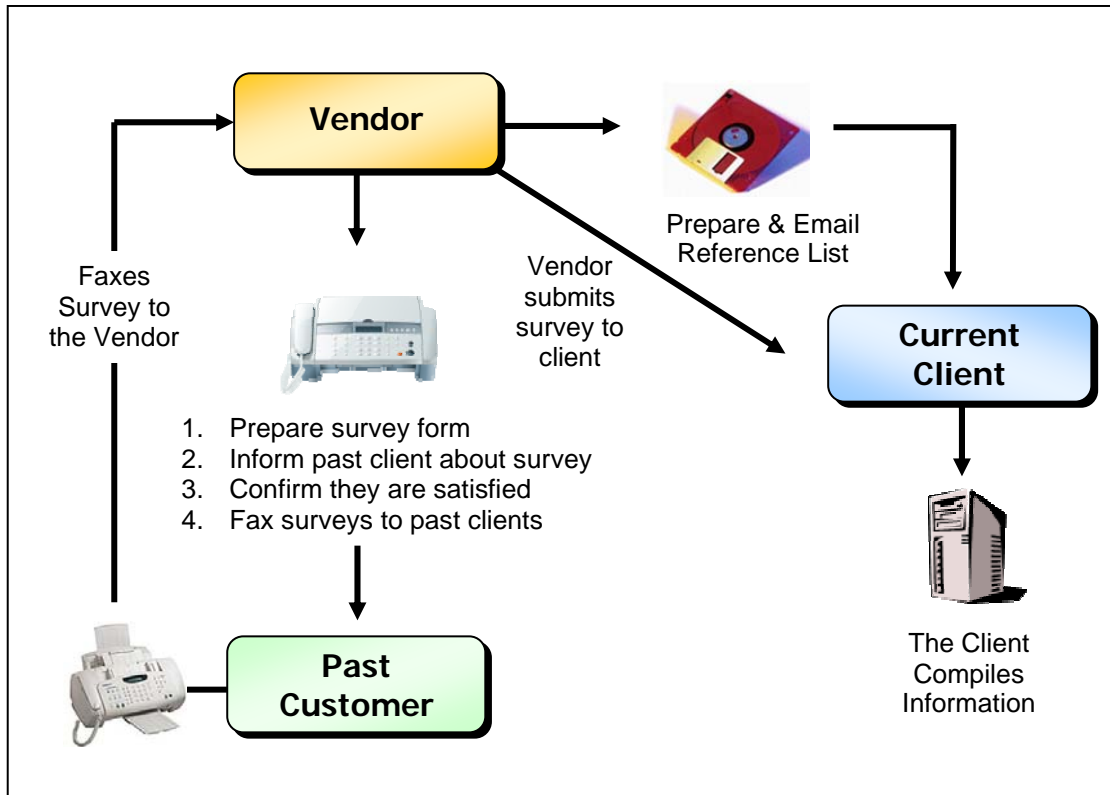


Figure 2: Modified Past Performance Information (PPI) Process

In the proposed modified system, the vendor becomes responsible for collecting all of their survey responses from their past clients (in the current system, the past clients return the survey directly to the current client). This modification has the following impacts:

1. The vendor knows who has / has not returned a survey. This will allow them to increase the number of returned surveys that they receive.
2. This may potentially increase the amount of work for the vendors (very minor increase), but various communications have indicated that the vendors are already having their past clients copy them on all survey scores.
3. The client should be able to reduce their efforts by 50% (they will not be needed to respond to request concerning returned surveys, and they will no longer need to investigate invalid surveys)

The potential risks to allowing this modification include:

1. The current client may fear that the vendor is altering or influencing the score.
2. The current client may fear that the vendor is disregarding bad surveys.

To minimize the potential risk of item 1 above, the modified system would require the past clients to sign each survey form, and the current client would reserve the right to randomly call any/all of the past clients to confirm their ratings. Any improper scores would result in penalties and/or disqualification.

To minimize the potential risk of item 2, the client would have to be educated that this risk is already a potential risk under the current system (since the vendors are instructed to only select their best scores). This may make it easier for a non-performer to get a better average rating, however, in the overall PIPS process, other factors should be used to prevent these vendors from proceeding.

### University of Minnesota PPI Analysis

In 2005, the University of Minnesota began testing the PIPS best-value program. During the initial pilot testing, the University used the current PPI process. In February 2008, the University elected to test the modified system proposed above (since they were convinced that the other filters in the PIPS process would prevent a non-performer from proceeding to award). The results of both processes are shown in Table 3.

Table 3

*Analysis of University of Minnesota Past Performance Information Processes*

No	Criteria	Current PPI Process (2005)	Modified PPI Process (2008)
1	Number of Firms	41	23
2	Average PPI Score (1-10)	9.7	9.6
3	Standard Deviation of PPI Scores	0.4	0.4
4	Average Number of Surveys Returned	20	17
5	Response Rate (Percent of Surveys Returned)	78%	95%

The results indicate that the modified PPI process has very little deviation from the results of the traditional PPI process (used in 2005). The number of surveys returned, the average score, and the standard deviation were similar in both processes. However, the greatest differential was with the response rate. Under the modified system, vendors are responsible for receiving the surveys. This allows them to follow up and obtain a higher response rate. This process also minimized the client’s efforts in responding to vendor requests.

### Future PPI Process

The modified process (currently being tested by the University of Minnesota) substantially increases the efficiency of the entire PPI process (for both the client and the vendor). However, the future may bring additional changes. Over the past 14 years, the PPI process has evolved.

Originally, the client assumed nearly all the risk of the PPI process. This included having the client responsible for creating survey forms, sending out surveys, calling the past clients to obtain a high response rate, receiving surveys, and compiling all of the data.

In an attempt to make the process more efficient, it was determined that the entity with the greatest, should be placed at risk. In this case, the vendor is at greatest risk for them obtaining an



award or not. The process was modified to require the vendor to prepare and send out all surveys.

The proposed modification, which is currently being tested requires the vendor to also receive and collect all of their surveys.

The logical next step would require that the vendor be responsible for compiling their own database. This step would require a leap of faith by the client due to the obvious risk that the vendor may make up or alter performance scores into their database. However, in the bigger scheme of things, vendors that need to spend time attempting to cheat the most insignificant filter of the system will eventually be caught (by other filters in the PIPS process).

This future modification would greatly minimize all risk to the client (for collecting and maintaining PPI scores), and also provide a key tool for vendors (so they can truly understand their actual past performance).

### **Conclusion**

Past performance information is a critical component for vendor evaluation, particularly for accountability, as current performance is always used to update and modify existing records of past performance. The optimization and implementation of past performance information use has been a long and arduous task, requiring numerous iterations, refinements, and hypothesis modifications. This paper presents a unique perspective as the results contained within are based upon actual iterations and projects, lessons learned, and enhancements made from the application of research concepts. Finding ways to minimize work while minimize risk is a difficult mandate for any researcher, and to date, the processes shown in this publication have been optimized to the greatest extent possible given the research results obtained. However, it is the anticipation of the authors that much refinement is still needed and will be incorporated as the future unfolds.

### **References**

Egbu, C., Sullivan, K., Kashiwagi, D. and Carey, B. (2008). Identification of the Use and Impact of Performance Information within the Construction Industry. CIB Working Commission 117, Tempe, AZ.

Hill, T. (1991) *Production and Operations Management: Text and Cases*. Second edition, Prentice Hall, 215–217.

Kashiwagi, D.T. (2008). *Best Value*. Tempe, AZ: Performance Based Studies Research Group (PBSRG).

Kashiwagi, D.T. and Parmar, D. (2004) Past Performance Information in the Construction Industry. ASC International Proceedings of the 40<sup>th</sup> Annual Conference. Provo, UT, CD Track CE, 22.

Lee A., Cooper R. and Aouad G. (2000). A Methodology for designing Performance measures for the UK construction Industry. Bizzare Conference Paper, Salford University.

Neely, A.D., Gregory, M. and Platts, K. (1995). "Performance measurement system design: a literature review and research agenda", *International Journal of Operations & Production Management*, Vol. 15 No. 4, pp. 80-116.