

## Case Study: Contracting Rolling Stock Maintenance of Utrecht Tramway, The Netherlands

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This is a case study of the Utrecht tramway rolling stock maintenance project (21.6M euros). The case study is unique to the Dutch environment, which has experienced many construction-related projects. As it is one of the first services contracts in this area, it is different from a construction project, where the performance can be more easily and quickly identified. Another unique factor is that the vendors are also less educated in the Best Value (BV) approach. The BV approach and concept of the “vendor having no financial risk, and the owner having all the financial risk” was not well understood. At the time of its procurement (May 2011), the understanding of the clarification period in the Netherlands was not mature, causing potential issues with this type of contract. The uniqueness of this project, coupled with the approach to BV, presents invaluable lessons learned for entities interested in implementing BV.

**Keywords:** best value, clarification period, maintenance contract

### Introduction Bestuur Regio Utrecht

The Utrecht region is the heart of The Netherlands. With a population of over 600,000 people, 400,000 jobs, and 300,000 houses in the Utrecht region, transportation reliability is critical. People move, change jobs, commute on a daily basis between home and work, and in all those movements they constantly cross over municipal boundaries. Utrecht is at the center of the national road and train traffic and the connection between the urban agglomeration of Western Holland (the Randstad) and the European hinterland. Bestuur Regio Utrecht (BRU), the Utrecht Regional Executive, promotes the interests of the region. In this executive agency, nine local authorities work together to ensure accessibility, quality of life and economic development. The nine local authorities form one region: the urban region. BRU's core duties are traffic, public transport, housing, economy and nature.

As the public transport authority for the region, BRU is responsible for granting and managing concessions. This includes matters such as timetables, fees, safety, communication and marketing. BRU owns the tramlines, tram stops, trams and tram depots, and is responsible for their management, maintenance and operation. This also applies to the future developments in light rail. The public transport ambition of BRU is to have a high quality public transport network in 2040 that fits an increased use of public transport, is affordable, available and sustainable.

## Project Background

The tram system of BRU, between Utrecht and its satellite cities Nieuwegein and IJsselstein (the so-called SUNIJ-line), is one of the most important public transport connections in this region and started operations in 1983. On a daily basis, 40,000 passengers are using the tramway. Until 2008, the concession holder Connexxion owned the rolling stock, stations and depot. Until 2010, the rail infrastructure was owned and managed by the Dutch mainline network operator ProRail. BRU became Asset Owner and Asset Manager of the rolling stock, stations, depot, and rail infrastructure and inherited existing maintenance contracts from predecessors.



Figure 1. Utrecht tram system

### *Procurement Strategy on Maintenance of Rolling Stock*

In line with infrastructure vision, BRU decided on contracting the Best Value (BV) vendor to maintain rolling stock, to ensure availability, improved reliability & safety of trams against the lowest possible cost:

1. BRU discovered that some existing contractors had developed a weak safety and performance culture, by working in the same way after more than 25 years.
2. Performance measurement on tram maintenance lacked maintenance and performance information.
3. In 2010 BRU decided on an asset management model with a strategic function and in outline at tactical level. This means all operational management tasks at a tactical level as well as all operation and maintenance tasks will be outsourced to third party contractors.
4. BRU's vision on the infrastructure tramway is to have a high performance tramway system with maintenance and performance information that supports the expectation: "availability of the best tramway system in The Netherlands, cost efficient & compact organization".

5. BRU also has an expectation that the BV contractor should, during the contract period, also help BRU to manage various project interfaces, such as major overhaul of fleet & rail system, expansion of tramway system to the Uithof (University Campus Area Utrecht) and introduction of new rolling stock in the nearby future.



Figure 2. Impression of expansion to the Uithof

### **Best Value (BV) Approach**

The BV approach was introduced to the Netherlands in 2004 and momentum in the use of the BV approach increased in 2008 as the Rijkswaterstaat started their \$1B fast-track infrastructure projects (van de Rijt & Witteveen 2011, van de Rijt & Santema 2012). The BV approach is a new paradigm that continues to transform as the stakeholders get a better understanding of the BV approach. The BV approach differs from traditional procurement processes in the following ways (Kashiwagi 2011):

1. Minimizes client/buyer decision making and direction and control.
2. Selects the BV vendor on the basis of performance and price.
3. Vendors create a transparent environment by proposing a plan to meet the client's needs, uses metrics to measure performance, and identifies and mitigates risk that they do not control.
4. Identifies that the expert vendor has no risk.
5. Vendors attempt to minimize their scope and risk that they do not control.
6. Client's and buyers assume financial responsibility for all risk.
7. The vendor is the offerer and the client is the acceptor of the vendor's proposal.

The implementation of the BV paradigm in the Netherlands was affected by various factors:

1. The Performance Information Procurement System (PIPS) approach was being continually modified in the United States to make the process easier to implement and simpler to understand. The Dutch implementation team led by Scenter and the Rijkswaterstaat, and later by NEVI, was a year behind the PBSRG process in the U.S. The Dutch model was therefore being improved every year.
2. The Dutch model emphasized the selection process in the first couple of years (2007-2009).
3. The emphasis changed to the clarification period activities of the vendor in the later years.

4. In the last year, the emphasis has changed from the owner controlled BV process to the vendor driven BV process.
5. The most difficult activity for vendors has been the identification of a detailed project plan, understanding how to quantify the risk that the vendor does not control, and how the vendor measures the risk.

*Impact of Information Measurement Theory (IMT)*

At the time of the running of this procurement, the emphasis of the Dutch BV effort was on the selection phase. This translated to the focus of the clients believing that the selection of the BV vendor was the most important issue. This led to a reaction of having vendors submit a scope of work as a part of the Project Capability PIPS filter (intent was to procure a high performance maintenance contractor). The Project Capability ratings are followed by an interview of the key personnel. They are rated based on what they understand they are offering in their proposals and the ability they show to manage the project at all times. Their interviews are also rated.

In this environment, the vendors are motivated to increase their scope of work that they are providing. This increases their risk and cost. However, if they do not increase their proposal, they might not get the project due to a low rating on their proposal. They therefore increase their proposed scope and worry about the increased risk after they are identified as the BV vendor. Their objective then becomes to get the project, and worry about how to do it after the award. This is a “short term, get the job” attitude. This is the spirit of the low bid vendor. Getting the job is much more important than doing the job well.

The client however is intent on identifying the BV or the largest scope for the lowest price. This forces them to:

1. Be an expert on what is being proposed. Make the decision if what is being proposed can be done for the price being proposed.
2. Make a decision on which is the better value.

Both of these actions require the client to:

1. Be the expert.
2. Use their own experience.
3. Assume that they understand what the vendor is proposing.
4. Make decisions.
5. Become liable for the decision they are making.
6. Shift all responsibility and accountability away from the vendor.

In a services contract, where the performance of the vendor is long term, this approach will lead to the price based, owner controlled environment. The vendors will become more reactive, the environment will become non-transparent, and both parties will lose.

The BV approach therefore, is for the vendors not to submit a proposed scope. This stops the buyers from making decisions and stops the vendors from increasing the scope, instead of

decreasing the scope to minimize their risk and improve value and performance as an expert. This concept was not understood at the time of the procurement, and therefore a scope was requested from the bidders. In the BV approach, the scope is only requested in the clarification phase (which follows the selection phase.) The selection is therefore done on dominant performance metrics showing capability, the ability to identify risk that the vendors do not control (motivating vendors to minimize their scope and do risk mitigation, and measure their performance of their risk mitigation), and add value for the lowest possible price.

This concept was continually briefed by the creator of the PIPS process, but he also identified that when the BV approach is first used, this concept is almost never understood (Kashiwagi 2012).

### Set Up of the Process

Besides the previous discussion on requesting the scope from vendors, the goal was to stay as close to the original BV PIPS methodology (as developed by Dr. Dean Kashiwagi) as possible, with a few adaptations. Earlier, the Ministry of Transport successfully made minor adaptations to the original PIPS methodology in its Fast Track Project (van de Rijt et al. 2011). In this section the differences between the methodologies used in the rolling stock maintenance contract and the “pure” PIPS methodology are described.

The budget of this project was \$28M and the duration of the contract is eight years (excluding one year prolongation of contract). The procurement phase was May to September 2011. It was anticipated that the vendors were not well-versed with the BV approach.

The differences with the optimized PIPS methodology are described as well as why changes were made. The phases and adaptations (Table 1) will be described.

Table 1

#### *Overview of phases and adaptations to BV PIPS methodology*

No.	Phase	Adaptation
1	Preparation	No adaptations were made
2	Selection	<ol style="list-style-type: none"> <li>1. Dutch ranking method (public sector clients) was used</li> <li>2. PPI as a PIPS filter was dropped, no alternative was used</li> <li>3. Scope document was added to project capabilities, rated and weighted to help client and vendors in making the PIPS/PIRMS paradigm shift</li> <li>4. The schedule was rated and weighted and focused only on the logical sequence between the activities and the RAVA plan</li> <li>5. Short listing on the basis of the Dutch ranking method</li> </ol>
3	Pre-Award (Clarification Period)	No adaptations were made
4	Execution (Risk Management and Quality Control)	No adaptations were made

### **Preparation Phase**

Education of selection committee and vendors was an important part of the procurement plan: Dutch BV expert Jeroen van de Rijt was hired to guide the contracting officer in applying the BV Approach to the tender and to educate the teams of client and vendors.

Vendors were invited, in the tender announcement, to visit the two 4-hour educational meetings in which the BV Approach was explained and information about the project was given. Both meetings focused on making the paradigm shift (to BV Procurement from traditional procurement). IMT, the vendor selection process and pre award phase were explained. Also vendors participated in an exercise on risk mitigation (to understand technical versus non-technical risk and value added). Vendors who attended the educational meetings had a hard time understanding the new contracting model, where the vendor manages/minimizes risk with the contract. To write their own contract in the Pre Award Phase did not fit into their bid management structure: getting their proposals authorized in their organization was not easy.

### **Selection Phase**

The intention was to copy the procurement phase as much as possible from the pure PIPS methodology. Award criteria were scope, risk assessment (technical and non-technical risk) & value added (RAVA) plans, schedule (planning), interviews, and pricing. Due to European tender regulations, some adaptations were made to the early 2011 PIPS methodology.

Within European law, contracts can be awarded either on the basis of lowest price or most economically advantageous tender (MEAT). Logically, the system of MEAT was chosen for rolling stock maintenance contracting. When an award is going to be based on MEAT the suppliers must be reasonably informed on the award criteria and relative weighting that will be applied to the award criteria. Award criteria must be objective criteria to ensure compliance with the principles of transparency; non-discrimination, equal treatment, and which guarantee tenders are assessed in conditions of effective competition. As mentioned before, the award criteria were RAVA plans, scope document, schedule (planning), interviews and pricing. Logically, these criteria were disclosed prior to the tender process.

In the Dutch infrastructure sector, bigger public clients have adapted a specific way to combine price and quality into BV (PSI Bouw 2007). A major adaptation was the short listing and ranking of the vendors based on their absolute scores (instead of the relative scores), and based on price deductions from quality scores is the “Dutch ranking method.” All “quality” criteria are “transformed” into “fictitious” Euros. To calculate which vendor has the most economically advantageous tender, the amount of “fictitious” Euros scored on quality is deducted from the vendor’s budget (Figure 3). This was the first adaptation to BV PIPS.

Criteria, weighting				
maximum year budget		€ 2.700.000,00		
RAVA	25%	€ -675.000,00	maximum fictitious deduction	} total maximum fictitious price deduction: € -2.160.000,00 total maximum fictitious price addition: € 2.160.000,00
scope	20%	€ -540.000,00	maximum fictitious deduction	
planning	5%	€ -135.000,00	maximum fictitious deduction	
interviews	30%	€ -810.000,00	maximum fictitious deduction	

Evaluation model	Fictitious price deduction			Fictitious price addition	
	100%	50%	0%	50%	100%
Rating	9	7	5	3	1
Criterion	Monetary value of rating				
RAVA	€ -675.000,00	€ -337.500,00	€ -	€ 337.500,00	€ 675.000,00
Scope	€ -540.000,00	€ -270.000,00	€ -	€ 270.000,00	€ 540.000,00
Planning	€ -135.000,00	€ -67.500,00	€ -	€ 67.500,00	€ 135.000,00
Interview1	€ -270.000,00	€ -135.000,00	€ -	€ 135.000,00	€ 270.000,00
Interview2	€ -270.000,00	€ -135.000,00	€ -	€ 135.000,00	€ 270.000,00
Interview3	€ -270.000,00	€ -135.000,00	€ -	€ 135.000,00	€ 270.000,00

Figure 3: Overview criteria, rating, monetary value of rating

Within the Selection Phase, there are also the following sub-phases or filters (van de Rijt & Santema 2009):

- Past Performance Information
- Project Capability (risk assessment (technical risk and non-technical risk) & value added, scope, planning)
- Short listing of vendors
- Interviews
- Ranking

### Past Performance Information

The second adaptation to BV PIPS was that Past Performance Information (PPI) was not used. Under European law, award criteria cannot include selection criteria (i.e. financial standing, technical or professional ability), therefore the PPI filter was dropped. No filter could be found to create the same effect as the PIPS filter for PPI, so no alternative was used. It was recognized the PIPS filters Project capability, Interviews and Pre Award period would be sufficient to show the BV at the end of the tendering process.

The use of performance metrics as a first selection filter to show project capability was not used on this project. Instead, performance metrics could be used by the vendors to demonstrate their capability of the proposed scope. Understanding of how to use dominant information to show capability that would minimize the decision making of the selection committee was not well understood by the vendors. Dominant information was to be considered in the form of metrics in which two people can more easily understand when communicating. This is the second most misunderstood issue after the scope issue previously discussed. The lack of understanding of dominant information that affects the vendor’s capability to understand their own performance and how they can improve their performance was detrimental. It also creates non-transparency where the client’s expectations may abuse the vendor’s performance.

To get some innovation into the traditional rail rolling stock market, no qualification criteria were used in the tendering process. To attract the more innovative automotive industry to enter

the tendering process, the “Open procedure” (within European tender regulations for special sectors), was used without any selection criteria.

The RFP was published only after the first educational meeting, opposite to simultaneously publishing announcement of the tender and tender documents, as is a custom in The Netherlands. This stimulated vendors to visit the educational meetings so the right context (BV Approach) was given to the RFP and discouraged non-committers from placing a bid.

#### *Selection Filter #1 Project Capabilities*

The Risk Assessment (technical and non-technical risk submittals) and Value Added (RAVA) were reviewed together as the first criterion, scope document as a second, planning as a third criterion. In contradiction to the 2011 PIPS methodology, a scope document was added as a criterion in the selection process (the third adaptation) to help client and vendors in making the PIPS/PIRMS paradigm shift.

The milestone schedule was rated and weighted in contradiction to the 2011 PIPS methodology. The schedule focused only on the logical sequence between the activities and the RAVA plan. This adaptation attributed to the contract characteristics that: speed of delivery was not a critical factor however was perceived as a distinctive element in the expert evaluation process when dominant information on RAVA and Scope document failed (and therefore mitigating the risk of not having valid submittals to enter the interview phase). The planning or scheduling issue is very similar to the scope issue. The only expert who understands the meaning of the scheduling is the expert vendor. The rating and weighting of the schedule was the fourth adaptation.

#### *Short Listing of Vendors*

To prevent excessive transaction costs created in the interview phase, since no PPI filter nor an alternative filter was used in the selection process, only submittals that were given an overall positive dominant rating on RAVA-scope-planning were invited to the interviews. After evaluating project capability documents, submittals rated with no fictitious price deduction or with a fictitious price addition (monetary value of  $< 0$ ) were discarded. Vendors whose submittals were rated a fictitious price deduction were invited to the next phase: interviews. The short listing method is explained under the “Dutch ranking method” in this document.

#### *Selection Filter #2 Interviews*

Vendors that were short listed for the interviews were asked to send 3 key individuals with operational responsibilities for planning, personnel and contract management on the tendered contract to the interviews. The interviews were held individually in 3 x 60 minutes and were rated first individually by the selection board members later unanimously with an overall score per interviewee. The selection board scores were checked on dominance.

#### *Selection Filter #3 Prioritize (Identify BV)*

The total monetary value of each submittal that was short listed was added to the financial bid of that submittal (ranking on the bases of "Dutch ranking method"). The highest rank is the lowest fictitious price and therefor the BV vendor. Short listing on the basis of the Dutch ranking method was the fifth adaptation.

### **Pre-Award Phase**

The BV vendor was invited to enter and lead the pre-award phase to clarify their proposal, start a detailed pre planning of the execution phase and to write the contract:

- The technical scope, financial plan, value adds and milestone schedule (planning) in their submittal were elaborated by the vendor and clarified;
- A risk management plan (RMP) was created by the vendor. All risks that were identified in the other vendors' submittals in the tender and the list of concerns from the client, were given to the vendor as part of the RMP;
- The vendor scheduled all meetings and deliverables, created a weekly risk report (WRR) and tracked all deviations during the pre-award phase in the WRR;
- The vendor assembled the contract.

Baseline deviation pricing was part of the financial plan for this eight-year maintenance contract. The baseline was set on historical data in year 2010 that was provided in the RFP by the client, such as data on rolling stock, technical failures, modifications, and vandalism. The duration of the pre award phase was determined by the vendor. During the pre-award phase the vendor could decide to withdraw from the project. If the client determined the vendor did not meet the requirements of the pre award phase, they could have decided not to award the contract to this vendor and invite the next prioritized BV vendor into a new pre award phase. The pre award phase started with a pre award meeting, in which the vendor was trained on the use of the weekly risk report, on the pre award period and execution phase. The pre award phase ended with a summary pre award meeting in which the final contract was presented by the vendor.

### **Execution Phase**

The execution phase started with an award meeting, where the contract was closed. The execution phase was broken down into two phases: the transition phase and the execution phase; the vendor used a specific WRR for each phase. During the transition phase, the vendor executed the hand over process and employee transfer. A part of the baseline information (that was provided by the previous vendor and was not audited by the client) proved to be inaccurate and complicated the transition phase. This caused risk for both the client and the vendor.

### **Results**

The goals of the procurement strategy were to contract a vendor who:

- Is focused on performance
- Makes rolling stock available that is needed to execute service/time table
- Gives above average attention to work safety

- Optimizes processes to reduce costs drastically
- Delivers a higher service level than the current vendor and
- Offers a transparent service level

The tender submittals of 3 vendors were received (Figure 4). The project capability of one submittal was evaluated under the required minimum quality and was subsequently discarded. The project capability of two submittals was evaluated above the required minimum; these vendors were invited to the interviews. The interviews were rated and the chart completed. The difference in price between the two vendors could not compensate the difference in fictitious monetary value. Vendor 2 was brought into the pre-award phase. The vendor met the client’s requirements in six weeks.

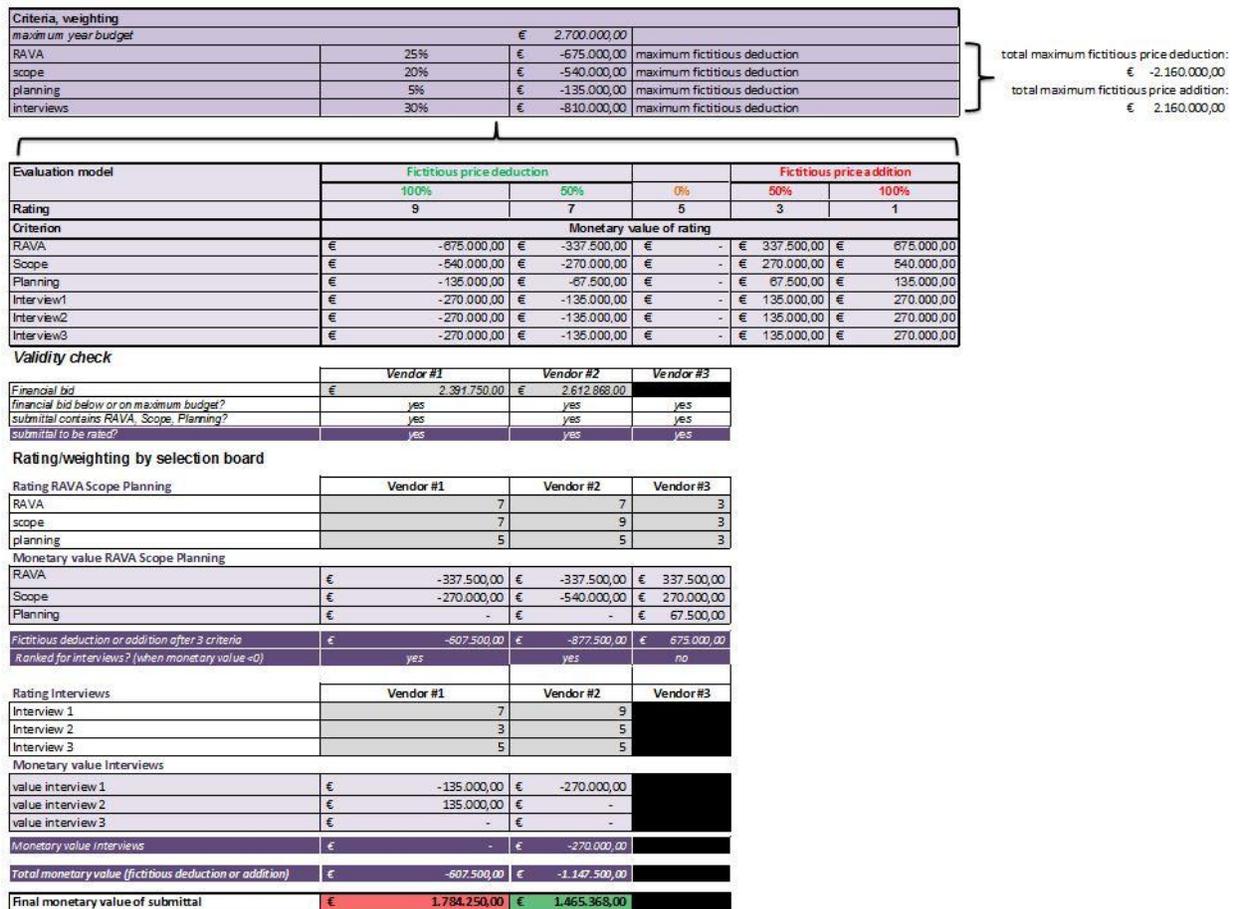


Figure 4: Overview of submittal evaluation results

Update

At the time of writing of this paper, there are still struggles in understanding and enacting the execution phase of the BV process on this project. The vendor is still having difficulties providing performance information and measurements that are dominant. The vendor is not using the WRR and there is no clear performance monitor in place for continuous improvement.

The lessons learned on this project should be utilized in order to ameliorate similar challenges on future projects.

### **Lessons Learned**

Due to the paradigm shift, as in other projects, the client concentrated on the selection phase of the BV approach. The biggest challenge was in the pre-award/clarification stage. Because the vendors had been in an owner controlled price based environment the vendor had a difficult time understanding the following:

1. The paradigm shift is that a BV expert has no risk. The BV expert is supposed to minimize their risk by minimizing the scope of the contract. Any risk is then the financial responsibility of the client. However, to do this, the BV vendor must know how to identify the value of their services in maximizing the service and quality of the client's equipment. This value that the vendor is providing must be clearly identified by performance metrics.
2. The only way that the vendor can do this is to identify how they will add value, and what can stop them from adding their value (risk that they do not control.) The risk that they do not control has to be quantifiable with metrics, and those metrics must be dominant enough to assist the parties who are responsible for the risk to be accountable. To help the vendor track the risk that they do not control, the vendor must have the performance metrics of the factors that they do not control which may put their maintenance performance at risk. These factors could be equipment usage or loading, vandalism, problems with the equipment that are manufacturing related, lack of maintenance area or equipment.

By not identifying their performance metrics and the performance metrics on the risk that they do not control, the vendor has created an environment of non-transparency where they are at risk to meet the expectations of the client. This creates an environment where the client may have high expectations, and where the vendor may be at risk due to the lack of performance metrics. The vendor was instructed to come up with the metrics as soon as possible.

This lesson learned on the importance of performance metrics to both define the expectation on the BV vendor and to protect the vendor against the risk that they do not control, is the most difficult part of the paradigm shift of the BV approach. The overall objective of the BV approach is to create transparency by measurements. The measurements minimize decision making, and therefore create consensus between the parties. Without the metrics, both the client and the vendor are forced back into using their own experience, making decisions and having expectations. This leads to the client/buyer to exercise direction and control to minimize the risk of nonperformance of the vendor, and could lead to a situation where the vendor perceives they are being abused or never doing enough.

### **Summary and Conclusions**

The client has evaluated the tender as successful with the following improvements:

- Client must verify/audit all project information that was given by current vendor
- Client and vendor need intensive training not only during preparation phase, but more during pre award phase/clarification stage and execution phase to help them to understand the paradigm shift.
- The vendor has to take responsibility for using a consultant to assist in understanding and implementing PIPS in his company.

Due to the process using a scope submittal, not understanding the importance of minimizing the risk that the vendor did not control, and the vendor not understanding the BV approach as more than a selection process, the vendor is now at more risk than in a price based situation. Due to this, the client will also lose because the vendor will waste resources in a reactive mode. This paper identifies the importance of understanding the theory behind PIPS, and understanding that it is a paradigm shift, and not just a procurement process.

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