Case Study: Performance Information Procurement System (PIPS) in the Netherlands

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ABSTRACT

The Dutch construction industry experienced a problem with collusion for five years ending in 2003. Innovative Dutch visionaries perceived a potential relationship between an inefficient, transaction laden, over-regulated low price award environment and supplier collusion. Kashiwagi and the Performance Based Studies Research Group (PBSRG) introduced the Construction Industry Structure (CIS) and best value Performance Information Procurement System to the Netherlands in 2004. Heijmans (third largest Dutch contractor) and the Rijkswaterstaat brought the PIPS technology into the Netherlands by signing licenses in 2006, Santema and Scenter/Delft University of Technology followed later in 2006, and became the first successful research group to build a PBSRG type research platform. In 2009, the Rijkswaterstaat utilized Scenter's expertise to deliver $800M of fast track infrastructure construction utilizing the best value PIPS concepts. The preliminary test results included the following: collusion problems may be caused by client delivery system, problem with construction industry performance is a process issue and not a technical issue, best value PIPS can solve Dutch construction problem issues and is a paradigm shift more than a legal issue, validation of the PBSRG model of simultaneous basic theoretical research, prototype testing, and implementation using industry funding may be the quickest way to change industry practices.

Keywords: *Best value procurement; Netherlands; PIPS; performance; measured environment*

INTRODUCTION

The worldwide construction industry has performance issues with projects delivering on time, on budget, with satisfied customers for the past 20 years (Dun and Bradstreet, 1997; Post, 1998; Adrian, 2001; McKinnon, 2001; Kashiwagi, 2004; Doree, 2004; NDU, 2005; CFMA, 2006; Simonson, 2006; AGC, 2006; Lepatner, 2007; Wearden, 2008; Ortiz, 2008; Myer, 2010.) Latham and Egan identified the issues in the UK in the early 1980s (Egan, 1998; Cahill and Puybaraud, 1994.) The same issues have been identified in the United States. The industry has tried to change the delivery system. First it was design-bid-build, then it was design-build, then it was construction manager at risk. Now the industry is proposing integrated project delivery (IPD.) They have also implemented versions of Private Public Partnerships and Design Build Operate. The industry has failed to increase the quality while decreasing the cost. Industry craftsperson skill has become less important. The industry is attempting to use management to minimize risk instead of expertise. In 1991, Kashiwagi proposed an industry structural analysis diagram (Figure 1) which introduced the following concepts:

1. Clients/buyers of construction minimized the risk in the price based environment using management, direction, and inspection.
2. Contractors minimized the risk in the best value environment utilizing expertise documented by past performance.

Later analysis (Kashiwagi, 2010), identified the following dominant characteristics of both environments:

Price Based Environment
1. Required more parties and therefore less efficient
2. Depended on the contract to enforce quality
3. The owner who was less of an expert was doing the directing and controlling
4. Minimal accountability
5. Enforcement of the contract terms
6. Non-transparency

Best Value Environment
1. Required less parties and therefore more efficient
2. No dependence on the contract for enforcement
3. The contractor who is the expert writes the contract
4. Maximum accountability
5. Minimization of project cost and time deviation
6. Transparency

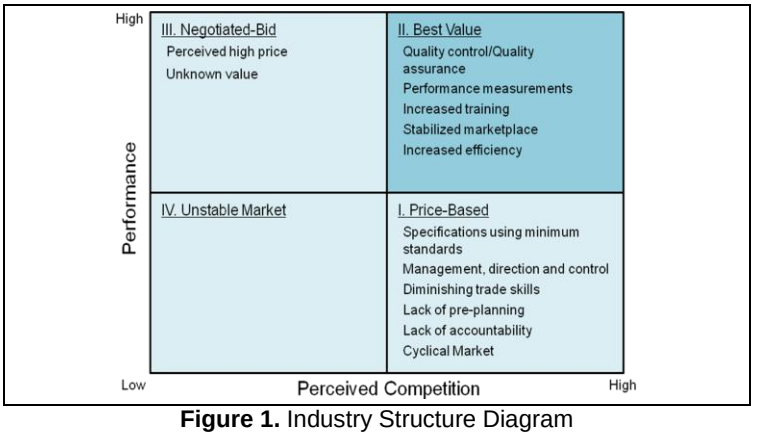

Figure 1. Industry Structure Diagram

In 2003 a legal/parliamentary/police effort identified that the Dutch construction industry was in collusion. The traditional reaction was to implement tighter procurement rules and more stringent management and inspection practices (Van de Rijt, Hompes & Santema 2008.) Kashiwagi proposed the opposite, fewer client rules and less client management, direction and control. Kashiwagi proposed that the clients had no control over the contractors; that cumbersome contracts did not minimize risk. He proposed that only expertise can minimize risk. He proposed that the heavily managed and directed price based delivery system was the source, the rationale, and motivation of the collusion. He also proposed that the non-transparency, the lack of accountability, the lengthy documents and the large number of decision makers on the client's side was causing inefficiency. The inefficiency was driving profit margins of contractors to unsustainable levels, forcing them to partner in a more efficient collusion structure. Kashiwagi was proposing that the client's inefficient and non-transparent delivery system and unaccountable decision making, was forcing the collusion. This message was brought to the Netherlands in 2004 (George Ang, 2011). George Ang (2011) and others (Santema, 2011; Prager, 2009; Van Duren et al, 2008), identified the mood and reaction of the Dutch procurement profession at the time:

"It became politically obvious that the current and more traditional procurement and business processes do lead to abuses in the form of collusion on pricing and the allocation

of work. They also inhibited competition and innovation, and so reduced progress in quality standards and productivity. There were inadequate incentives for higher performance or better value and firms were not sufficiently orientated towards their clients. The overall effect was to give the industry an increasingly poor image, which would put off young talented people from seeking employment in the building and construction industry. It's a method to become more efficient. With an annual turnover of approximately € 60 billion, comprised of 85,000 firms and around 526,000 employees, the sector represents more than 7% of the Dutch GNP, i.e. a major national economic asset. The previous reports and the Parliamentary Inquiry therefore set a firm basis for reform. Due to market irregularities, and as a consequence of similar fraud and collusion scandals in a few other countries worldwide, the restoration of trust has become a major reform issue. Political commitment on this issue has been essential for the initiation of the Dutch national reform process in building and construction. Three Ministers (Trade & Industry; Transport & Civil Works; Housing, Spatial Planning and the Environment) issued a political Action Agenda in November 2003, based on five main objectives:

1. *Restoring trust between the government and the sector*
2. *Developing effective markets and a properly functioning sector*
3. *Enhancing professionalism in procurement*
4. *Instilling high standards in the supply chain*
5. *Less, but more effective, regulation*

An expert network for professional public procurement (PIANO: Professioneel Inkopen en Aanbesteden Netwerk Overheid opdrachtgevers) was raised as to support the implementation of these objectives. Since 2003 it became politically obvious that the same management, direction, and control would definitely not bring improvement after the 2002 scandal. Meanwhile, the best value PIPS method drew attention because it minimizes the need to management and direction, and because the performance measurements, increases transparency." (Ang, 2011)

Santema (2008) also proposed that the Dutch were being affected by the international competitive marketplace, and realized that the traditional procurement model of low price award and negotiation was actually lowering the quality of the products. He proposed that the Dutch needed a dominant way to simultaneously increase quality and cut cost. Best value PIPS offered a methodology of utilization of expertise, alignment of resources, and efficiency to improve value and quality and reduce cost. The minimization of management, direction, and control transactions is in alignment with efficiency. The PIPS solution of using expertise instead of costly management transactions to minimize risk is an innovative proposal. Kashiwagi, using the industry structure model, proposed that the clients are responsible for the poor performance and collusion due to the inefficiency of the low price award delivery mechanism. He proposed using the best value environment utilizing best value PIPS. The major differences with PIPS included:

1. Minimizes client/buyer decision making, management, direction, and control.
2. Uses a vendor proposed contract as a risk management tool instead of a control mechanism.
3. Identifies the vendor as the expert, and not the client's representatives.
4. Minimizes the use of technical expertise of the client's representatives except to ensure that the vendor is an expert at the beginning of the project.
5. Utilizes expertise instead of management, direction, and control to minimize risk.

6. Identifies the client's intent, but allows the vendor to determine the final deliverable.
7. Lowers cost, and increases value and quality due to efficiency due to minimizing transactions and alignment of resources.

After hearing the industry structure presentation, George Ang invited Kashiwagi to Rotterdam to present to government buyers of construction in 2004. A Heijmans representative and representatives from Rijkswaterstaat, who attended the fall 2004 presentation, then followed up and attended the 2005 Best Value PIPS conference in Tempe, Arizona. As a result of the conference attendance, both Heijmans and Rijkswaterstaat signed licenses with ASU to use the best value PIPS technology in 2006. Heijmans used it to buy subcontractor services and materials, and to assist clients to utilize the best value service as a consulting project manager. The Rijkswaterstaat was educated annually by Kashiwagi, until 2008 when project managers Wiebe Witteveen and Carlita Vis received approval to run best value PIPS on the $800M US critical fast track projects in the Netherlands.

PROBLEM

Kashiwagi and Heijmans identify three problems in implementing best value PIPS in the Netherlands:

1. The vocabulary of best value PIPS and IMT needed a Dutch proponent who could translate best value PIPS into the Dutch language and vocabulary.
2. Dutch academic research groups in construction management have difficulty working with CIB W117 to transfer the technology. A research platform that could imitate PBSRG would be needed.
3. Dutch traditional procurement model is 180 degrees different, and resistance to change is almost insurmountable as 80% of all procurement is low price award driven (Van de Rijt, Hompes & Santema, 2008; Prager, 2009.)

Heijmans identified Sicco Santema, a marketing and supply chain professor at Delft University of Technology University, as the optimal Dutch proponent of PIPS in 2006. He was the perfect fit as he was teaching/proposing supply chain improvement by the minimization of transactions. His supply chain background, feel for common sense and simplicity, and his recognition of the accuracy of the PIPS concepts solved the first two problems listed above. What assisted Sicco was his understanding that the traditional academic structure may not be conducive to the PIPS implementation, so he augmented the university capability with his consultancy firm, Scenter. They immediately started running tests inside and outside of the construction industry. In 2008, Sicco and partner Jeroen van de Rijt, were identified as CIB W117 platform leaders in the Netherlands, and were licensed with the PIPS technology. They proceeded to setup small research tests to test best value PIPS, and also attended the annual conference in Tempe, Arizona. Scenter quickly picked up the PBSRG, Arizona State University (ASU) research model. PBSRG worked hand in hand to ensure Scenter had the following capabilities:

1. Deductive logic, observation, instead of inductive logic, exploratory research.
2. Industry funding model, aligning research funding from industry parties who are trying to solve the same problem.

3. Validation of research hypothesis by case study results of confirmation, continuation of industry funding and research testing instead of industry consensus through statistical analysis of industry survey results and academic peer review.
4. Use of extremes and dominance results minimized the need for statistical analysis of results that is normally needed in inductive research.
5. Use of deductive logic instead of industry best practice, and introduction of "disruptive" technology and not evolution of existing practices or stepwise improvement.

The PBSRG research model had not proven to be successfully transferrable to other research group or to other countries. Efforts to transfer the technology and research to Central Connecticut University in 2004, Florida International University in 2005/2006, Georgia Tech in 2007, Glasgow Caledonian University (2004-2007), University of Technology at Mara (2004-present), University of Science Malaysia (USM), Penang, Malaysia, University of Botswana, Gaborone, Botswana (2008-present), University of Auckland, Auckland, New Zealand (2007- present), RMIT (Melbourne, Australia) (2009-present) have not been successful.

A review of a journal paper on the history of the development of best value PIPS (Ahmed, 2010), proposed that unless more traditional research testing is done, PIPS research would not be successfully transferred to other universities or countries. He proposed that until that time, the problem of the industry and academic research being isolated from each other will not be overcome. Scenter proved that once the paradigm is transferred, and best value PIPS is implemented, the following are natural results:

1. Alignment of research partners from industry who are at risk with the research test, making the industry partner a full partner in the research, and allowing the visionary researcher full control over the research test.
2. The continuation of research funding with successful test results allowing the researcher to become an expert in the area of project delivery, risk management, and supply chain optimization. The researcher does not have to chase government research funding, which continues to change from year to year. The researcher becomes a true expert, able to drill down into the subject matter.
3. Sustainable and continuous research with research laboratory and testing capability.
4. Continuous funding independent of government research funding which is highly competitive, often political (Kashiwagi, 2010), and awarded by board of academic peers with traditional research thinking.

REQUIREMENTS OF DUTCH IMPLEMENTATION

The following were the requirements for the Dutch testing of best value PIPS:

1. Setting up Dutch research group using PBSRG model of consultancy, using an industry funding model instead of government research grants, and simultaneous basic theoretical research and prototype testing of best value PIPS.
2. Convincing a client to partner with the research group.
3. Modifying best value PIPS to meet the European procurement laws.
4. Identifying Dutch clients to test the modified best value PIPS process.
5. Run the research tests.
6. Analyze the results.

HYPOTHESIS

Use deductive logic (observation of logical concepts) and case study testing to show:

1. Best value PIPS can resolve Dutch construction performance issues and collusion.
2. The PBSRG research model (funding, using deductive logic and dominant information) is transferrable and has the potential to impact industry practice faster than traditional research programs.
3. Problems with construction performance and quality may not be technical, but may be caused the buyer/client's delivery system.
4. Dutch collusion problem is caused by the government's delivery system (management, direction, and control, and award by low price) and not by the vendors, who are simply reacting to the environment of the client's delivery system.
5. PIPS is a paradigm shift more than a legal issue.
6. PIPS can increase value and quality and minimize delivery cost and time.

METHODOLOGY

The methodology to validate the hypothesis includes:

1. Identify Dutch government proponent that wants to optimize delivery of construction.
2. Identify Dutch visionary who can implement best value PIPS technology and can use a new research model to help change the industry.
3. Transfer PIPS technology to the Dutch visionary researcher, and industry practitioner.
4. Modify PIPS system and use components that meet European procurement law.
5. Run procurement tests.
6. Assess performance of the technology.
7. Assess the success of the Scenter application of the PBSRG model.

RESEARCH ACTIVITY

Scenter and Delft University of Technology signed license agreements with ASU in 2008 and became CIB W117 platform leaders in the Netherlands. In 2008 and 2009, Scenter had completed numerous PIPS projects, formed the W117 group, and a visionary group to help steer the Dutch effort. In 2009, Rijkswaterstaat decides to use the best value PIPS concepts to deliver $800M of critical infrastructure modifications called "fast track" projects. Scenter becomes key research partner/consultant in Rijkswaterstaat effort. In 2010, the 16 fast track projects were awarded, and Scenter had published the first PIPS book in Dutch.

BEST VALUE PIPS PROCESS

BVP/PIPS is a process/structure to optimize the delivery of services by hiring experts instead of managing the risk. It changes the procurement agent's role from being the guardian over the award of a contract, to a facilitator of the delivery of expert services. The new role of facilitator starts when a user has a requirement, and ends when the expert

service has been delivered. The BVP/PIPS has three phases: selection, pre-award, and management of the project risk (Figure 2.) The selection phase has five filters (Figure 3): past performance information, competitive ability to manage and minimize project risk, interview of key personnel, prioritizing the vendors and doing a dominance check to ensure that the best value vendor is the best value. The client's representatives assume the vendors are experts through the selection process (award process in the Netherlands) then, to assume the best value vendor is not an expert in the pre-award phase to minimize the risk of the best value vendor not being an expert. The paradigm is to minimize the need for technical decision making in the selection process, and maximizing the need for the best value vendor to prove they are an expert in the pre-award phase. The paradigm forces vendors to show dominant differential in performance that minimizes the need for any client technical decision making during selection. The risk is shifted to the vendors to show value through dominant expertise, knowing that experts minimize both risk and cost, thus providing the best value for the lowest cost.

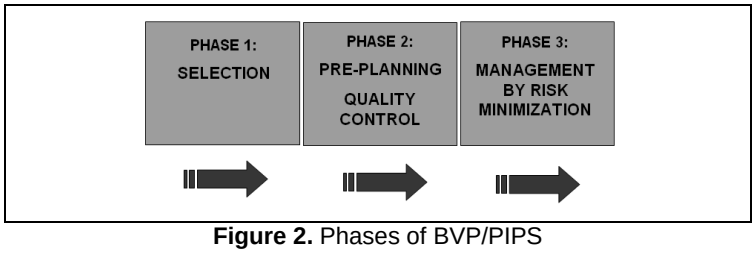

Figure 2. Phases of BVP/PIPS

Prioritization of Alternatives

Vendors are selected based on (in prioritized order of importance):

1. Interview (rated, and weighted)
2. Non-technical risk that the vendor does not control (rated blind and weighted)
3. Technical risk that the vendor does control (rated blind and weighted)
4. Value added deliverables (rated blind and weighted)
5. Past performance information (not rated or seen, weighted)
6. Cost (weighted, but not seen or rated by selection committee)

When a blind rating is done, the selection committee does not see the contractor's name. The maximum length for any blind submittal is two pages. The rating scheme for all criteria is "10" for dominantly better, "5" for the lack of dominant information, and "1" for dominantly poor performance. If a decision has to be made, the rating is a "5". Dominant information has to be either supported by verifiable performance information or best value practices, both which can be easily verified during the pre-award process. If any of the submitted information is not accurate, the contractor option is eliminated immediately upon discovery, but at the latest in the pre-award period.

Dominance Check

The system is cost controlled by a dominance check before the pre-award phase. If a vendor is more expensive than a preset amount over the next best value or lower in cost than the average cost, dominant information is required to prevent elimination of that option.

Dominant is a term that means easy to see, a consensus opinion, or a no brainer that minimizes the need for long justification explanations. The procurement agent's dominance check before the identification of the best value vendor can override the prioritization based on the selection criteria. This is a subjective decision made by the procurement officer based on access to all the information.

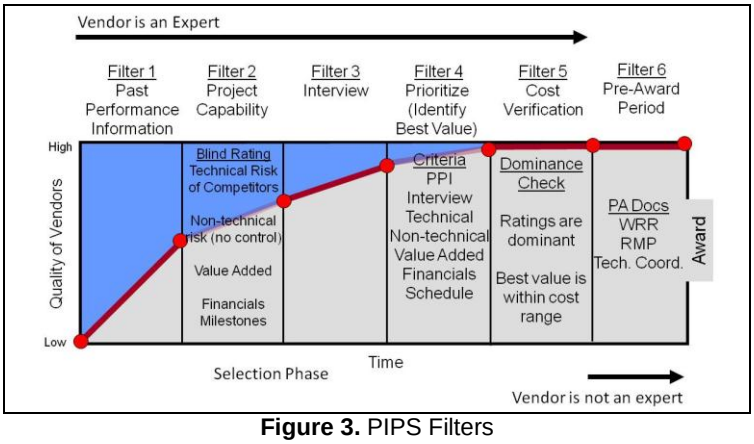

Figure 3. PIPS Filters

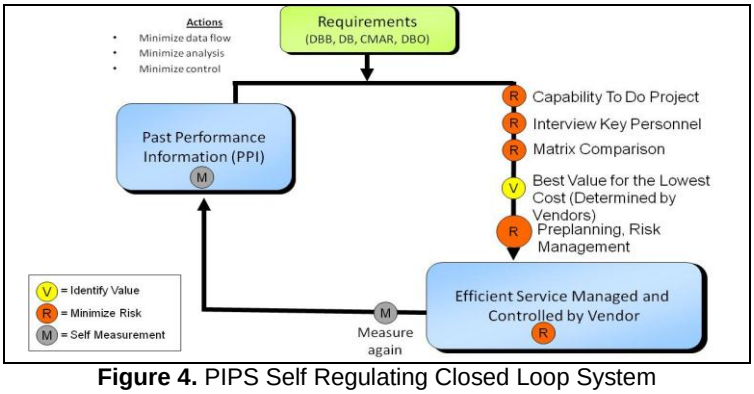

Figure 4. PIPS Self Regulating Closed Loop System

PIPS Pre-Award Phase

The BVP/PIPS is a closed loop system (Figure 4.) After prioritization, only one vendor at a time can move into the pre-award phase. The pre-award phase is the most important phase of the BVP/PIPS. If done correctly, the pre-award phase should be used as a clarification period to clarify how the vendor will deliver what they have proposed. It is the time to verify the technical competency of the contractor. Once the client is assured that the prioritized best value vendor is the best value (creates an approved risk management plan (RMP) and weekly risk report (WRR) and performance measurements (PM)), the contract is awarded to the best value vendor. The best value vendor uses the contract as a risk minimization mechanism, by meeting the technical requirements of the project and managing and minimizing the risk that they do not control.

The RMP is a living document that identifies concerns or risks to the project. The RMP should identify:

1. The risk and who causes the risk.
2. How the vendor will attempt to minimize the risk from happening.
3. If the risk happens, what the vendor will do.
4. Should identify the best ways to solve the risk, cost and time deviations, and which method should be used and why.
5. The time frame the client should make the decision to approve.

The RMP must be approved by the client, and becomes a living document throughout the project duration. The WRR contains the following:

1. Points of contacts who will receive the WRR during the project.
2. Milestone schedule.
3. Risk Management Plan (RMP).
4. Risk sheet that identifies who caused the risk, solution, and time and cost deviations.
5. Modifications (deviations) on the project.
6. Performance measurements for services contracts.

If a risk happens and causes a cost or time deviation, the risk is explained and documented on the risk sheet. If the risk has not happened it goes on the RMP, and a plan to minimize the risk, and mitigate it if it happens is documented. All modifications should have concise, simple, and dominant documentation. The WRR should be distributed weekly to all the participants who are involved and interested. The weekly risk report (WRR) and the risk management plan (RMP) are the main document and communications of the contract administration. It allows the owner's representatives to do quality assurance. It therefore defines quality assurance as a non-technical function.

DUTCH TESTING OF THE PIPS PROCESS

Scenter and others conducted tests other than the Rijkswaterstaat tests (CIB W117 Journal, 2011; Van Duren et al, 2008; Prager, 2009), but this paper will focus on the Rijkswaterstaat tests due to their size and importance. Wiebe Witteveen and Carlita Vis from the Rijkswaterstaat, utilizing the expertise of Sicco Santema and Jeroen van de Rijt of Scenter with the assistance of PBSRG, made the $800M fast track projects at the Rijkswaterstaat the largest PIPS tests in the world and the centerpiece of the Dutch effort (Veenendaal et al, 2011). Rijkswaterstaat is the government agency who is responsible for execution of the public works and water management, including the construction and maintenance of waterways and roads in the Netherlands. The Rijkswaterstaat is the executive arm of the Dutch Ministry Infrastructure and Environment. The road network in the Netherlands (specifically the Randstad area) is heavily congested, with unreliable journey times of one in five during the rush hour. Most of the traffic jams in the Netherlands (81% in 2005) are concentrated in the Randstad. The Randstad (a city at the edge of a circle, with empty space in the centre) is a conurbation in the Netherlands. It consists of the four largest Dutch cities (Amsterdam, Rotterdam, The Hague and Utrecht), and the surrounding areas. Its 7.5 million inhabitants make up almost half of the population of the Netherlands. In the Netherlands there are extensive procedures preceding road construction. The average lead-time from idea to new road is over 20 years. A law was passed called “Besluitvorming Versnelling Wegprojecten” (translated: “Decision for Accelerated Road projects”). This law simplifies some public procedures concerning environmental issues for

30 specific road bottlenecks starting January 1st, 2009. This enables Rijkswaterstaat to take some quick measures to enlarge highway capacity and reduce congestion on several locations on the Dutch road network. The Dutch Ministry of Infrastructure and Environment has identified 30 major bottlenecks, which need to be resolved by May 1, 2011.

The procurement strategy focused primarily on the acceleration of the delivery of the projects. Rijkwaterstaat has developed a shorter tender procedure than the traditional way of tendering road projects. The second goal of the strategy was to maintain enough competitors for the projects. Another goal of the procurement strategy was to optimize price and quality (best value.) The main reason for using the Best Value Procurement/Performance Information Procurement System (BVP/PIPS) is that the procurement of Design and Build-contracts usually leads to high transaction costs (efforts of all possible suppliers) and long tender procedures. In 2009 the tender capacity in the Dutch market was limited. Therefore suppliers/contractors have asked Rijkswaterstaat to develop a procurement strategy heavily based on quality (most economically advantageous tender (MEAT) where contractors receive credit for value) to lower the transaction costs and shorten the tender procedure. As a government agency Rijkswaterstaat has to follow the European legislation on public works. Rijkswaterstaat has adopted BVP/PIPS for 16 of the 30 bottleneck projects. As speed and quality is of the utmost importance, the BVP/PIPS will be used to select the best suppliers who will do the infrastructural work for 16 selected projects (typical work: asphalting, making acoustic screens, road signs and signals, lighting, adding extra lanes next to existing lanes, renovating bridges, gantry sign / overhead traffic sign, etc). The 16 projects have been divided into 6 clusters. For each of these clusters the Best Value Procurement process has been used. While designing the process, the goal was to stay as close to the original PIPS methodology (as developed by Dean Kashiwagi) as possible, with a few adaptations. The following differences are reviewed (Van de Rijt et al, 2011):

1. Use of "consultation sessions" for individual contractors.
2. Past Performance Information (PPI) was not used in the selection. PPI is currently a political issue in the Netherlands and in European law.
3. The project capability submittals did not include value added. All items had to be included in the contractor's submittal. This was a legal interpretation of the lawyers to meet European law.
4. Assessing the Risk Assessment independently from the Value Added plan. This was a difference when the project was planned, but is no longer a difference.
5. “Planning” (scheduling) was the coherence between milestones and the RAVA plan. This was a difference when the project was run, but is in congruence with the current PIPS process.
6. Less weight was given to the interviews based on the unfamiliarity of using ratings of interviews as selection criteria.
7. Vendors can choose themselves, which 3 roles (and corresponding key persons) to send to the interviews. This was also a difference at the time, but is no longer a difference.
8. Making use of two independent teams who each come to a consensus score through individual ratings of the submittals and the interview, after which the final score for each vendor (on each criterion) is determined by consensus of the two groups by the group leaders.
9. Ranking the vendors based on their absolute scores (instead of the relative scores), and based on price “deductions from quality scores.” These rankings are based on

an objective rating that is transferred into credit for value added. All credit is transformed into fictitious Euros with the lowest price being the prioritized best value.

10. The pre-award phase was not utilized due to the fear of "communications" after the prioritization. European laws are very strict on "communications" before the award. This difference is a legal interpretation, and since these tests, the Rijkswaterstaat may use the pre-award period as a clarification period in future tests.
11. Use of a "risk fund" or contingency fund. This can also be utilized in PIPS. Normally the difference is the contractor controls the fund.

Of the eleven identified differences, seven of them are no longer differences with the latest PIPS process. Except for the interview process, the Rijkswaterstaat ran a very good best value PIPS process.

RESULTS OF THE FIRST SIX TESTS

Six clusters have been tendered and have started the design or construction phase. The goal of the procurement strategy was to accelerate the delivery and minimize the length of the tender procedure, to maintain the competition and to procure the best possible value. The first conclusion is that this procurement strategy, made the acceleration of the projects possible. All the tenders were executed within a period of five months, where a tender for this type of projects usually takes eight to ten months. The transaction time is cut in half. The early involvement of the vendors has the potential to accelerate the delivery of the projects an additional 18 months. The focuses on timely delivery of projects, lead to shortened proposals by the vendors for construction. The number of vendors that participated in the six tenders was sufficient and comparable to the usual number for projects of this size. One of the most important findings of the market consultation was that there was a shortage in tender capacity in the infrastructure market in 2009. The risk for Rijkswaterstaat was that not enough vendors would participate for the projects of the Fast Track program. On average every tender has had 5 vendors bidding, with a minimum of 3 on one project and 6 on two projects. The vendors by their participation, showed keen interest in the new best value PIPS process (Van de Rijt, et al, 2011.)

The third goal of the procurement strategy was to achieve the best possible value for the projects. In 50% of the tenders the vendor with the highest quality is also the winner. In the three other tenders the winner had the second or third highest value. This suggests that the procurement process had a bias to vendors with high quality. The test of the process was to produce the best value for the lowest cost. The risk was that the Rijkswaterstaat may pay a much higher price. In 5 out of 6 tenders the lowest price is not the MEAT (best value), the exception being package E. In 67% of the tenders, the second lowest priced competitor is the best value. This means that quality and a competitive price were obtained. The conclusion about price and budget however should be made at the end of the project, taking regard of all the change orders (Van de Rijt et al, 2011.)

The interviews made up 20% of the ranking. The interviews were very differentiating. There were no problems in scoring different key persons. The free choice of the key persons by the vendors did not raise any problems. This allayed fears of the Rijkswaterstaat that interviews would be perceived as non-transparent (Van de Rijt et al, 2011.)

Another observation is that the individual consultation sessions during the tender sometimes led to attempts to verify chances of risks minimizing measures by the vendors. Not answering these questions was sometimes misunderstood by the vendors and led to perceptions of non-transparency. This is due to lack of understanding by the vendors and should be resolved with more education and experience with the best value PIPS process.

ANALYSIS OF THE DUTCH EFFORT

There were three main problems identified at the beginning of the Dutch effort. First, can we find a Dutch researcher/practitioner who can translate best value PIPS into the Dutch language and vocabulary. This has been solved with the setting up of Scenter as a PBSRG unit in the Netherlands, and with the core team of the Rijkswaterstaat. Second, was the issue of finding a Dutch academic research group that was capable of using the PBSRG's model. This has also been satisfied by Scenter. It is the opinion of the authors that regardless of how many become certified to teach BVP/PIPS, a group like Scenter which is tied to PBSRG, is essential for continued stability and implementation of the BVP/PIPS. Third, where the traditional procurement model is 180 degrees different, will the Dutch procurement be able to make the paradigm shift? This has been resolved as the 2010 NEVI keynote address by Kashiwagi to a well receiving audience of over 300 procurement agents, the high number of PIPS tests in the last two years, the attendance of 25 Dutch procurement dignitaries, Rijkswaterstaat officials, and other government procurement agents to the 2011 Annual Best Value Conference in Tempe, Arizona, the invitation of PIANO to Kashiwagi as a keynote address in the 2011 conference and the possibility of exposing over 1,000 Dutch procurement agents to PIPS, a very positive review of the PIPS process by one of the leading procurement specialists in the Netherlands (Telgen, 2010), and congruent analysis of the PIPs process by other experts (Van Duren et al, 2008), the publishing of the first PIPS book in Dutch which sold 2,000 copies of the first edition (Van de Rijt and Santema, 2009), and the introduction to the rest of Europe in the 2011 Innovation conference shows that the procurement community has understood and is willing to make the paradigm shift. The analysis leads to the successful validation of the hypothesis:

1. Best value PIPS can resolve Dutch construction performance issues and collusion.
2. The PBSRG research model (funding, using deductive logic and dominant information) is transferrable and has the potential to impact industry practice faster than traditional research programs.
3. Problems with construction performance and quality may not be technical, but may be caused the buyer/client's delivery system.
4. Dutch collusion problem is caused by the government's delivery system (management, direction, and control, and award by low price) and not by the vendors, who are simply reacting to the environment of the client's delivery system.
5. PIPS is a paradigm shift more than a legal issue.
6. PIPS can increase value and quality and minimize delivery cost and time.

CONCLUSIONS

The following are preliminary results and conclusions to the current Dutch testing:

1. PIPS is not only an American solution and can be run within European law.

2. The new research model of using deductive logic, action research, can be transferred from PBSRG, Arizona State University (ASU) to other institutions and parties and can be used to impact the industry practices.
3. Dutch Rijkswaterstaat agency is testing best value PIPS concepts in the largest test of PIPS in 17 years, $800M delivery of critical infrastructure highway improvements (16 different projects.) A Rijkswaterstaat initiated feasibility study on PIPS was complimentary and allows further PIPS testing (Van Weele, 2008), and a secondary review of the tests based on the input of all the participants is allowing further testing (Telgen, 2010.)
4. A consultancy has been hired to create a plan to make best value PIPS sustainable in the Rijkswaterstaat.
5. Further testing at Rijkswaterstaat.
6. Secondary study done on the validity of PIPS (Van Duren et al, 2008.)
7. Third study done by a masters student in innovation management also identifies successful test results (Prager, 2009.)
8. Dutch version of Best Value PIPS book sold out 2,000 copies in the first year (Van de Rijt and Santema, 2009.)

As a result of the Rijkswaterstaat test results, other test results, and Scenter's success in transferring the technology and using the PBSRG research model, the following is taking place in the Netherlands and in Europe:

1. Kashiwagi was selected as a keynote 2010 keynote speaker at NEVI (Dutch association of procurement managers) and as a result, NEVI will be focusing on best value PIPS in 2011.
2. Rijkswaterstaat visionaries are taking best value PIPS to the 2011 European Innovation conference to expose other European clients to the PIPS philosophy.
3. Scenter has expanded testing to other industries (shipbuilding, medical, commodity services, and other private sector clients.)
4. Scenter and Delft University of Technology and other Dutch visionaries are now working on a strategic plan to sustain the testing and development of PIPS.

The Dutch tests have been a validation of the new research model initiated at PBSRG, Arizona State University (ASU.) Using deductive logic and observation, instead of inductive logic and exploratory research, an impact is being made in the Dutch delivery of construction services. The use of operational funds of a visionary client instead of government research funding, has aligned the efforts of different industry parties who are trying to solve the same problem. Validation of research hypothesis is done by dominant case study results of confirmation. It has also led to continued industry funding and research testing instead of the traditional consensus of peer review by academic research peers. The use of dominant results (minimizes the need for decision making and inductive studies), minimizes the need for statistical analysis of surveyed industry perceptions. The use of deductive logic instead of industry best practice, and introduction of "disruptive" technology instead of evolving existing practices has led to dramatic breakthroughs in increasing value and quality of construction services.

RELATED QUESTIONS AND FURTHER RESEARCH

The following are topics for further research:

1. Is the current university research model effective in solving industry issues, or are other models, more efficient?
2. Does the research of construction industry practices belong in the industry or at the universities?
3. Is the reason for difficulty in solving the problems of construction industry performance issues in the research system or in the complexity of the problem?

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