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Letter from the Editor **December 2014**

Dear friends,

Another year has passed. 2014 has been one of the best years for our journal. I have now been in the Construction Management Research area for 22 years. At the Performance Based Studies Research Group [PBSRG] at Arizona State University our research effort to improve the delivery of construction and other services has spanned 21 years, $16M, 6 countries, and 31 states in the United States. I have participated in CIB conferences, task groups and working groups over the 21 years. My mentor, Professor William Badger, recently retired in 2013, and is still participating in leadership research at the age of 80 years. At age 62, I must seriously consider passing my knowledge on to our future leader Kenneth Sullivan. Most of my CIB peers from the 1990s have retired or passed away. The years now seem a blur.

After 20 years of watching the state of construction management, procurement and the delivery of services, the research of how to deliver construction that has higher value and lower project cost and risk seems to be going into its third "ten year cycle." Highly rated publications seem to be more contingent on the journal name and technical analysis of industry opinion [with maximized number of numerical charts and statistical analysis] and new names for the same ideas of the previous cycle that were not successfully implemented. Many young researchers are not aware of who is Edward Deming or John Gault. The construction industry remains in its own silo, separate from the construction management research silo. It is almost as if the construction management research area continues to generate faculty researchers, who are in a fraternity, moving around and getting involved in research efforts that are government funded, getting promoted and then generating more faculty researchers, but never having impact on the construction industry. This environment where nothing happens in highly regarded scientific research was identified by Ayn Rand in the book "Atlas Shrugged" in 1950.

I am in my last cycle to put together a database of names and efforts in the delivery of services [construction and non-construction] for W117 Journal of the Advancement of Performance Information and Value in the Construction Industry. As I go out of the industry, it will be ushered into the next twenty years by Associate Professor Kenneth Sullivan [my protégé and peer for the last five years]. Along with a new stable of young professors, he will attempt to take the research to the next level [having impact on the performance of delivered services utilizing transparency, a dominant language of metrics that communicates between industry experts and owner/buyer non-experts], and a new methodology to minimize stress of all stakeholders. Their dream should be to make a difference.

I know we as researchers can have an impact on the delivery of construction and other services. I have seen what very few professors and researchers have seen. It should be the vision and dream of all young lecturers and assistant professors over the length of their career to see "real impact" and change, caused by the academic research community. I have seen:

1. An industry funded 20 year $16M research effort that had no support of any governmental research group such as the National Science Foundation [NSF].
2. Over 1,700 research tests in six different countries.

3. Research receive the highest honors from the industry including the 2005 Corenet Global Innovation of the Year Award and the 2012 Dutch Sourcing Award.
4. The largest university in the United States, Arizona State University with an enrollment of 83,000 students, giving the Performance Based Studies Research Group the opportunity to use their developed logic and technology to deliver services that returned $100M to the University in the first three tests.
5. Development of a new technology where a construction manager can know almost anything without knowing anything, and implement this into a prestigious Barrett Honors Program at Arizona State University, and implement this in research tests with amazing results.
6. Watch the transformation of the delivery of services in an entire country, the Netherlands, starting with implementation of the research based idea on a $1B infrastructure test, receiving the Dutch Sourcing Award in 2012, being supported by both the professional procurement group NEVI and the risk management organization RISNET/CROW and proceeding to be implemented as the procurement model of choice in the Dutch government agencies.
7. Personally witness, assist, and document one of the highest performing ICT vendors who has no management, direction and control functions in the company [in a very troubled ICT services industry with very poor performance] move from an agile project management model to a best value model.
8. Observe the Arizona State University Arizona Technology Enterprises intellectual property management group issue 38 licenses on the best value approach technology, making the Best Value technology the most licensed technology at the 24th rated research university in the U.S.

As we bring in the new year of 2015, I applaud the innovative efforts of the CIB and W117, the construction industry research community and research visionaries. To young researchers everywhere, we can make a difference. We can have a vision! We can add value.

Happy Holidays and a Happy New 2015.

Professor Dean Kashiwagi

Dean T. Kashiwagi

Kenneth T. Sullivan

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Rescue Management of a Failed Project: An Empirical Case Study of the Subordinate Expertise Empowerment (SEE) Model

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This paper introduces a management model applied to rescue a failed digital documenting services contract involving a large multinational vendor, referred to as Vendor A (VA), a large university in the United States, referred to as X University (XU). The author's objective is to tests the theory, in a case study setting, that a failed contract could be measurably salvaged through the real-time observed application of a rescue effort which emphasizes a Subordinate-Expert Empowerment (SEE) model in project rescue from its post-failure status. As a part of the literature review, an overview of project failure and varying rescue methodologies is given with an assessment of backgrounds, environments and strengths and weaknesses. Results of the study indicate the model's ability to address the difficult issues of complex contracts by placing subordinate expertise at the forefront of dilemmas to grapple with the intricacies involved in escalated scenarios. Support of the model's effectiveness was verified with a component listing of the resurrected project elements coupled with the survey results of all key individuals of the rescue process.

Keywords: Contract Rescue, Best Value, Contract Salvage, Project Management

Introduction

The subject of a poorly performing project is elusively difficult to address from a scholarly perspective. Such scenarios typically include environments of finger pointing, strained relationships, short tempers and even utter silence; all of which make the collection of credible data extremely difficult to conduct and understand. Equally difficult to analyze is the process of successfully correcting a failing project away from its inevitable path of failure towards one that has a semblance of success. What would seem obvious for such a change to succeed would be the role of effective management. However, what might not seem so obvious is the possible importance of the role of subordinate expertise in such a scenarios as well as the properly

administered relationship framework between the two parties in mitigating project dilemmas.

Project Failure

Ailing and Failing Projects

The study of elements in project crisis and failure has been researched for many years across various industries with the emphasis on understanding the reasons behind such events. (Nitihamyong & Skibniewski, 2006; Conboy, 2010; Nelson, 2007; Ivory & Alderman, 2005). Though not standardized by definition, the term failure in projects can range anywhere from performing below expectations in terms of cost, schedule and quality to being completely abandoned or cancelled. Reports over the past decade and a half show that varying levels of project failure are more clearly indicated by observing tasks involved across varying industries. For example, Information Technology-related failures reported at 18% (Tichy & Bascom, 2008) whereas in the Customer relations Management field of projects, rates have been as high as 60-80% (Kale, 2004; Foss, 2008). By comparison, software projects report an 11-15% cancellation rate (Eman, & Koru, 2008).

Strewn on these paths to failure are parallel histories of escalated attention, diverted resources and unsuccessful attempts to alleviate a growing list of cost, schedule and quality targets that have been missed. (Mahring & Keil, 2008; Pan, Pan & Flynn, 2004). Each venture has its own version of failing to meet the expectations of budgets, schedules or overall satisfaction by those involved.

Though many of the projects do not experience full-fledged termination, their tendency to fall short of the expectations is extensive. Technologically-related fields, for example, report this to vary between 40-53% (Eman & Koru, 2008; Tichy & Bascom, 2008). However, in a more general industry study of outsourced projects, it is shown that expectations failures are as much as 75% (Bryce & Useem 1998).

What is also notable is an increased tolerance, acceptance and even expectation by management that such projects perform poorly (Paul 2007). This point is illustrated in the construction industry disparities of project failure as outlined by Post. His research shows high perceptions of success rates in construction projects with relatively high rates of dissatisfaction in the management within the project (1998).

Fallout of Failure

Regardless of the outcome of a project or contract in the path to failure, there are two constants that remain. First, both supervisor and subordinates suffer losses due to the reallocation of efforts away from value-added tasks and towards defense/accusations surrounding the enforcement of the agreement. Secondly, in the mists of such delays, supervising groups still stand in need for services or goods both during and after such a failure.

Additionally, what goes without saying in escalated situations is that levels of stress, conflict, finger pointing and other tensions become a large part of the equation that is essential to address but difficult to measure. Ironically, the very reactions that managers have in failing projects

make it so difficult and rare to measurably reverse in a live case example (Pan, Pan & Flynn, 2004; Montealegre & Keil, 2000). Equally difficult may be the prompt mobilization of sufficient resources to adequately assess the issues at hand between members of the project team and apply the preset process of such a model.

Overview of Managerial Rescue Models

The authors have made an express effort to explore and define documented studies that were available in the arena of poorly performing or failed contract redevelopment. Though much has been published on project formulation, protocol, litigation, mediation, arbitration and maintenance there are only a handful of studies found in the arena of rescues of failing contractual projects (Montealegre & Keil, 2000) and nothing was found in the area of cancelled projects being revitalized. This exhaustive search has been undertaken to outline various documented models to mitigate troubled contract scenarios between project members. Five such methodologies were found to fit such an approach which applications ranged across various industries and several countries throughout the world. These methodologies are presented below.

Performance Based Contracting (PBC)

A review of municipal transportation projects conducted by Hensher & Houghton with cities in Brazil, Chile, Australia, and New Zealand along with the theoretical application of the PBC model to detail relative benefits of market bid vs. negotiated awarding. Process for addressing the usefulness of various aspects of contractual agreements and their effectiveness. Areas addressed range from cost benchmarking, income sharing incentives, contract flexibility and even accountability. The purpose of the research was to help international observers to be better able to apply public policy in their transport arenas (2004). Though the model was tested, the results were not quantified academically and the impact of such a system is unknown.

Contract Management Capacity (CMC)

Stemmed from the debate of U.S. municipal and county contract failures and pitfalls, Brown and Potoski theorize in modular form a possible missing link in the discussion of how to improve a government's contract performance. It outlines how buyers may not be investing sufficient resources (or capacity) to oversee the proper administration of contracts between buyers and vendors. Key "capacities" are proposed to require strengthening such as Feasibility Assessment Capacity, Implementation Capacity and Evaluation Capacity which would in turn bring improvements in procured contract efficiency (2003). No actual tests of this model have been made as it is purely theoretical.

Victorian Government School Cleaning Contract Program (VGSCCP)

This model was developed in part by an Australian school district which focuses on the buyer's ability to enforce regulation and quality standards from facilities cleaning vendors. The model originated from another Australian government department but was modified and inserted into a scenario where the existing contractual relations had soured and the public outcry attracted a

media spotlight to see the results of such a test. The model focuses on the qualifying of bidders with minimal standards to bid work and the formulation of compliance committees to oversee the approval and performance of such vendors (Howe & Landau 2009). This model has found notable results in improving the quality of the bidding vendors and success in the appeasing of public outcry. Weaknesses in the model stem from the lack of measurements in its process and the vast level of resources and oversight in order to maintain such a system.

The De-escalation Management Model (DMM)

The DMM model was structured by a team of scholars which worked to aid in the de-escalation of "runaway projects" related to information technology that have far surpassed the bounds of cost, schedule and quality in information technology-related fields. Derived from three prevailing methodologies of crisis management in projects, the DMM is proposed as a piece in the process of getting contracts back onto a desirable track towards possible rescue of the project. (Flynn, Pan, Keil, & Mahring, 2009). The model emphasizes proactive planning for deviations, encouragement of reporting bad news and disrupting commitment down undesirable paths in project management. It utilizes a cyclical flow of steps coupled with a rated level of commitment by the organization involved in the process of de-escalating such projects. Though not reportedly tested or applied to a specific case, it is likely that the elements of the model were tested in past case studies.

Enterprise Resource Planning (ERP)

The ERP model was derived from a case where a failing IT implementation project for a national beer brewery in China was rescued by senior management actions in an escalated project. Three key steps in the process included narrowing down the project management scope, the alignment of individuals with tasks that are needed and heightened oversight of the company's general manager through chairing weekly meetings (Kim Man Lui & Chan 2008). The ERP model relies heavily in the actions of upper management and a good deal of resources from the general manager in the conducting but emphasizes the ability for non-technically trained individuals to create environments of accountability and transparency in a high technical project.

The span of the reviewed literature reached across industrial, geographical and cultural boundaries in the authors' search for rescue models in projects. Industries vary widely ranging from transportation, information technology, custodial and general governmental purchasing which include both the procurement of goods and services. Geographically, the theoretical methodologies cover both North and South America, Australia, New Zealand and Asia and culturally, it spanned both eastern and western cultures.

Case Study Theory

As a preface to the analysis of the models, certain ground rules of case study theory would be helpful to review. This is due to the fact that exploratory research, interpretations of the relationship between empirical case studies, theoretical development and the application of models must be linked, analyzed and rated academically for their strength in validity. Theoretical behavior research blended with methodological constructs creates an abundance of

models that can be used as fodder among theorists. However, these models gain their greatest validity via case studies where the process is tested with live subjects in real environments with documented results (Sullivan, Kashiwagi & Lines 2011). Whether applied from initiation or mid-project, it is this real test on live participants that gives the creation of a model its figurative breath of life (Lee, 1989). It is this inductive generalizability that methodologists not only accept as reliable research (Benbasat et al., 1987), but actually place greatest confidence in, where theory is both novel and limited (Eisenhardt, 1989; Lee & Baskerville, 2003). Langley articulates this relationship with the empirical and theory validation by stating that "theory development is a synthetic process. Whatever strategy is used, there will always be an uncodifiable step that relies on the insight and imagination of the researcher" (1999). The authors also accept that case studies differ in their own relative strength based on such variables as the timing of the model application, sufficient measurement of results and, where possible, accurate accounts of the initial conditions.

Comparative Case Study Analysis

After reviewing the methodologies, and their aim to repair problems in current relationships between actors in the project management process, it is found that their tactics vary in resource requirements greatly. The CMC, DMM and ERP, for example, require added regulation through oversight committee's executive involvement and other capacities in order to minimize issues in administering contracts. This growth in supervision equates to added administration layers in the process as well as increased costs. On the preventative side, both the PBC and DMM take the stance that contractual issues that have potential risk should be addressed early on in the procurement process at the time before the award is made. This coincides with the generally accepted philosophy that problems should be dealt with as early on as possible to avoid them surfacing mid contract and costing more to mitigate (PMI 2008). With its focus on the negotiated award, it also addresses the potential benefits of working with vendor feedback in the development of workable contracts.

Strengths and weaknesses from the data given are also observed as follows. The CMC & DMM models, as it turns out, are purely theoretical in that they were not tested with any subjects. CMC is largely used as a hypothetical proposal from which governmental departments can draw from for addressing administrative issues in procurement and DMM, though compiled from elements of previously case-tested material, was not employed in any live setting for observation. The PBC model, though created and hypothetically modeled for the use of transportation agencies in specific countries, was also never inserted into a live setting for empirical observation. The VGSCCP example was both modeled and inserted into a specific environment between school administrative purchasers and vendors. Results of such modeling were notable but not academically quantified.

It is from such review that the authors have endeavored to create a working rescue model that can be inserted into an environment for empirical testing where the process and results can be quantifiably measured and academically reported. Such a setting is presented in the case between the purchasing client of one of the largest universities in the United States of America and its copy and digital documenting vendor, a multinational conglomerate corporation. The environment was such that the relationship and contract for digital documenting services would

inevitably terminate under the existing set of conditions.

History and Failure of the Project

X University (XU) and Vendor A (VA) had created an agreement where XU would provide the campus venue and clientele with digital documenting needs and VA provides the services, equipment and network infrastructure to service their needs.
The XU organization consists of over 70,000 students and roughly 12,000 faculty and staff members over a span of four campuses, 17 internal colleges and over 200 serviceable buildings. Ranking within the top three largest schools in the U.S., XU's copy and document needs would cover the oversight of thousands of machines and millions of copy units per year (X University 2010). Interlaced among this scholastic structure is a framework of various campus software networks and databases from which the multifunctional documenting units would be digitally linked for counting, repairs and networking.

VA, on the other hand, is part of a multinational conglomerate, which is also based out of a foreign country location. It consists of just over 11,000 employees and has regional offices in every major metropolitan area in the US. In the field of digital documenting services, it competes with other companies such as Hewlett Packard, Xerox and Ricoh (Hoovers 2010).

Review of Original Agreement

The agreement began in September of 2006 with an original five year contract that could be renewed with five year increments over a 20 year period. Estimated yearly revenue streams were between $2-3 Million. It is assumed that the contract was awarded in a standard and traditional manner based on buyers stating a scope and vendors competing based on marketing efforts. The terms and verbiage were kept simple on this 23-page contract with eight single sentence bullet points summarizing the responsibilities of each party.

Termination

The XU-VA contract ran for approximately 2 years and 3 months before it was officially terminated and later revised in its status to be suspended until further notice. Recorded details of the relationship and performance are sketchy at best. Over the life of the shortened contract there were 6 amendments added sporadically which grew the contract size from 23 to 144 pages. Additions varied from maintenance pricing clarifications to the giving of additional storage warehouses space for supplies. There seemed to be no quantifiable pattern of large scale decay based on the changes to contract over the two years. Though vague in its description, studies in contract failures support the supposition that such problems are common across various industries and client-vendor relationships (Alchian & Demsetz 1972, Barthelemy 2003, Deming 1982, DiRomulaldo & Gurbaxani 1998).

Rescue Management - Application of the SEE Model

An outline of the Subordinate Expert Empowerment rescue model is one that applies Best Value practices in contract management with additional features which address unique environment of a fledgling contract. These are listed below:

SEE Project Rescue Steps

1. Transition the project into a temporary "Safe Mode" during the rescue process
2. Baseline Assessment: Measurements of Feasibility & Reestablishment of Trust
3. Scope Realization Process through Subordinate Expertise
4. Assessment of Risk and Mitigation Plan Development
5. Metrics Development of Revised Contract
6. Legal Translation & Amendment Protocol
7. Project Management by Risk Reporting and Mitigation

As a part of the decision to try to redeem the project, the university sought the help of a 3rd party research group known as the Performance Based Studies Research Group (PBSRG) that would act as an educator, advisor, liaison and mediator in the salvage process. During the research group's 18 years of existence at Arizona State University, it has formulated and tested performance based processes in contract purchasing, planning and administration. The more widely tested and complete model, commonly known as "Best Value", has been documented and tested in over 800 trials in the U.S. and abroad for procurement effectiveness in various industries such as construction related services, healthcare, food services, IT, Custodial, Furniture, and retail (Kashiwagi et al., 2012; Sullivan & Michael, 2008). A significant variation of the model's application is that the process was inserted midway through the relationship where both sides had exercised termination options due to poor performance and communication. Normal application of the more complete model would include the methodological identification and selection of the greatest source expert part for the project at hand (Kashiwagi, 2006). However, due to the current entrenched status of VA and XU, it was assumed that VA was the subordinate source expert in the project group.

Education and facilitation of the model method, principles and procedure were given by the research group from XU in the form of presentation, phone conference and face to face meetings with the four key members of the project team. Observed progress of the model process was documented in real-time annotations of each of the sessions conducted. Total education meeting time where interactions took place totaled 30.5 hours and the number of man hours contributed to such sessions was 193.25.

As illustrated in Figure 1, education of both parties in Best Value practice include areas such as useful and accurate self-measurement, application of metrics towards optimized administration and the shifting of risk, power and control in contract formulation and administration towards the subordinate-expert and away from the supervising party. Special care was also taken in maintaining as unbiased of a relationship as was possible in such a relationship between both parties as educators and facilitators (Burgess & Burgess, 1997; Badger, 2011).

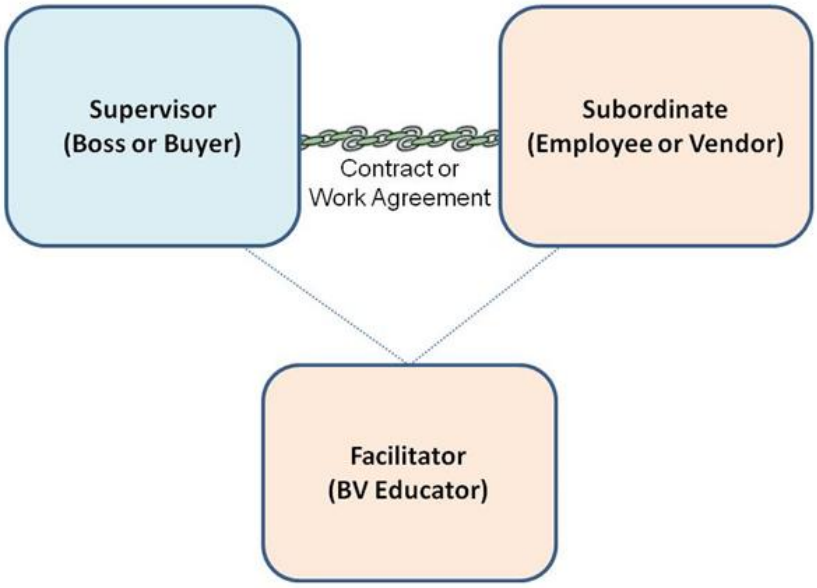

Figure 1: Best Value Educator Role in Rescue Process

During the education period, understanding of the SEE terminology and method is achieved by reducing the management relationship to its simplest forms. In its most abstract sense, the supervisory-subordinate relationship is found between individuals and groups in the form of relationships such as client-vendor, boss-employee, owner-contractor, officer-private, teacher-student, and even parent-child. For this reason, labeling terms like vendor and contractor are used in this literature interchangeably with subordinate whereas other titles such as client, buyer or owner are interchangeable with supervisor. In the realm of professional relationships, two assumptions are made on which the model is based. These are given as follows:

1. The subordinate party has contributing value and expertise contributing to the project goal
2. Optimization is achieved when the supervising party (i.e.: buyer, client, boss or other supervisor) facilitates the path for the subordinate (vendor, contractor, employee or other subordinate) without trying to direct and control them away from the path that the expert knows is correct.

The Rescue Model in Practice

Project "Safe Mode"

Both parties agreed to put the contract into a transitional "Safe Mode" where basic transactions were maintained while discussion and negotiations took place towards what was to become a resurrecting monumental amendment. Regular meetings between the liaison and each party were scheduled between two and three times per week where progressive steps in the salvage process were carried out over the period of appropriately 12 months. Initially, meetings were solely with each party and the educator but as the process progressed meetings with all three parties were held to discuss the scope realization, Development of Metrics and Agreement Flexibility as well

as amendment finalization. The salvage of such a contract required the following of steps where each step represents a phase or milestone part of the salvage process that not only mitigated the initial impasse but also plotted a future route away from common pitfalls of unsatisfactory agreements. Figure 2 illustrates the model's high reliance on the expertise of the individuals or collective subordinate-expertise empowerment group that falls most within the following criteria:

- Has the best comprehension of the needs and risks of carrying out the successful implementation of the project intentions
- Has the most experience in providing solutions to the complex problems within the project
- Has the most time to spend on mitigating risks in project
- Has the most at stake for success or failure of project
- Greatest expertise in the project industry
- Highest exposure (in terms of time) to the project progress status
- Closest proximity to the project status
- Draws on vendor/subordinate expertise to address project complexities and effectively communicate key project information to the team involved
- Has most experience in understanding which individuals or other obstructions are in the way of the team's ability to maintain project quality, schedule and costs

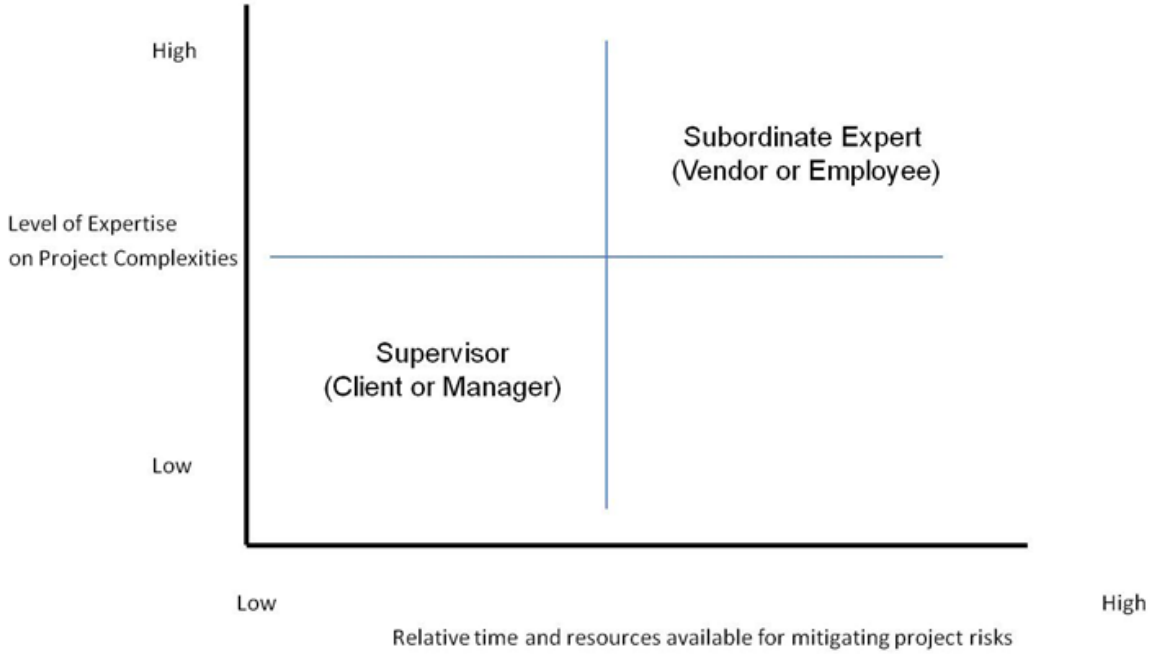

Figure 2: Alignment of Expertise with Resources in Project Management

Though in supervisory/subordinate scenarios there may be clear cases where the client, buyer, boss or supervisor would possess higher levels of some of the above points. However, as a general rule, the group that has the highest level of each and all of the points would tend to be the empowered vendor/subordinate.

As a part of the SEE model, it is assumed that the selected subordinate has that experience and expertise and thus, is commissioned to direct the formulation of the agreement requirements as well as show their fulfillment through accurate means. On the other end, the supervisory party, in this case, the client representatives, must effectively play the role of a facilitator of the project success and not the directing and controlling force.

Baseline Assessment: Measurements of Feasibility & Reestablishment of Trust

A logical beginning of a Project salvage attempt is to initiate a reassessment and healing period where both parties have a chance to vent their frustrations and mistakes of the past and lay a more firm foundation of trust between themselves. Questions by the educator were brought up asking "what should have been done differently" or even "should we have even had such an agreement". It also allowed time for both sides to reevaluate the environment of what they had to offer and what was hoped to be gained from an agreement over the 5 - 20 year term of the contract that would be balanced to both sides over the span. Ultimately, the purpose of this phase was to regain a level of trust and perspective that would allow for confidence in negotiability without the careless oversight of the initial contract (Mellewigt et al., 2007). This reestablishment of trust is an integral part of resetting the direction and diminishing relations from its escalated course (Bass, 1994; Mezirow, 2000; Barthelemy, 2001; Deming, 1982).

Scope Realization Process using SEE constructs

As stated earlier, one of the fundamental differences in the subordinate expert empowered model stems from how the stage is set in the supervisor-subordinate relationship. This is where the scopes of traditional competitively outsourced contract are dictated by supervisors in the request for proposal and the buyer is expected to follow all of the ordered instructions as shown in Figure 3.

With the SEE model, the buyer illustrates what they want in an agreement in the form of an intent statement. This is an open ended aspiration of the buyer coupled with cost and schedule restraints that is to be reviewed and adjusted by the vendor as needed towards optimizing delivery. With this concept, illustrated in Figure 4, the customer may have a specific idea of what they want in terms of goods and services but lack the expertise in knowing how and when it can be accomplished in the most efficient way (DiRomualdo, 1998). It is also not uncommon that the buyer does not know if their desired scope is even possible given the budgetary and logistic constraints that they have. The end result of this process is that the vendor in essence is empowered to write the scope which becomes a part of the contract. An illustration of this is directing flow is also demonstrated in Figure 3.

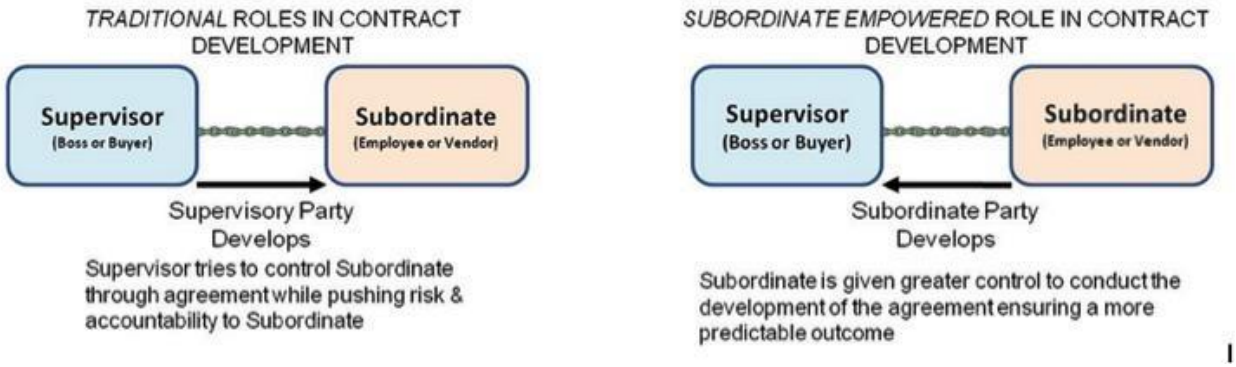

Figure 3: Traditional vs. SEE Model in Contract Development

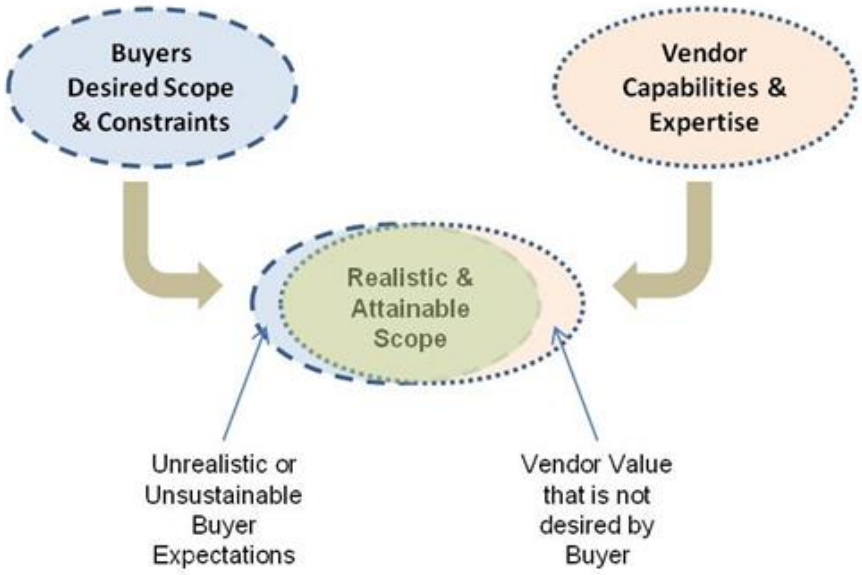

Figure 4: Scope Realization by Subordinate Expert Empowerment (SEE)

Assessment of Risk and Mitigation Plan Development

As an extension of the scope realization, the vendor is also asked to outline any risks in a project that could possibly obstruct them from fulfilling their part of the agreement. Specifically, they are required focus in on any risks that they don't directly control and outline a mitigation plan as to how these potential problems could be diffused either before or in the event that they occur. This Vendor-written scope and mitigation plan become a part of the contract agreement. (Kashiwagi, 2006).

Metrics Development

Critical to the success of a contract is a means to simply and accurately display the compliance

of the vendor-written scope and mitigation plan. There needs to be a regularly established set of measurements that both parties understand and can follow to assure that the contract is being fulfilled (Alchian & Demsetz, 1972; Mc Chesney, 1982). Obviously the tracking and allocating of financial figures are a fundamental starting point that is followed closely by both sides in order to gauge performance. Further metrics are added in a periodic display of acceptable levels of quality in goods and services which again are displayed to both parties. Finally, a schedule is outlined as to when such transactions and quality levels will be reported.

Although such measurements and planning are in no way new to contract development, the paradigm shift in this model is that it is the vendor party that takes the reins in outlining them as well as warranting compliance. They are given the responsibility to create a means of displaying its own worth via periodic quality reporting, scheduled milestones of activity and, of course, financial reporting. This information is then outlined and agreed upon by both parties as a part of the contract development. However, when the vendor is given the contract and told to create their own level of quality, vendor performance and accountability have been theorized to benefit the customer.

Added into the measurement of the contract performance, is the planned periodic adjustment of its scope as needed through the life of the agreement. This flexibility must be built into the development process allowing both parties to make incremental adjustments to their agreement addressing unforeseen yet relevant issues and the arrangements to accommodate them (Harrison, 2004).

Legal Translation & Amendment Protocol

A final element of the contract formulation covers the legal description of the agreed elements of the contract. Once again, this is written by the vendor and negotiated between both parties until an acceptable verbiage is accomplished. Though this model does not address a specific sequence of translating the agreed requirements to descriptive legal jargon, it is considered a standard and required step towards finalizing the agreement. It is worth noting, however, that such traditional legalistic jargon does not effectively dictate what is to be carried out in agreements (Larson, 1992). It does serve as a safety net in the event of arbitration or litigation. The end result is a contract that is predominantly created by the vendor which consists of both a legalese and clearly described version of the agreement in addition to the metrical description of how the elements will be certified by the vendor to the customer.

Risk Management Administration of Amended Agreement

Upon final agreement and signing of a contract to be salvaged, a capstone element of the model is the process of inspection, compliance and enforcement through the scheduled periodic reporting of risks by the vendor. By allowing the Vendor to have an empowered part in creating the schedule, scope, risk plan and other measurable, compliance to such a baseline becomes more fully owned by the vendor and, therefore, more likely to occur (Kashiwagi, 2008). Also, because of the active role that they play, it is in their best interest to prove their competency through a high level of maintenance according to the agreement. Lastly, risk reporting also gives the vendors a voice to document instances where the customer may not be keeping their end of

the bargain and thus negatively affecting their ability to perform.

Results

Following the steps in the model, a creation of a SEE-created agreement which optimized XU's vast and complex digital documenting environment. By allowing the most expert party of the group to plan for and grapple with the complex environmental factors without the excessive oversight of the supervising party as displayed in Figure 2. Validation of the results of utilizing SEE are divided into two sections which analyze measured results through observed changes in the team relationship structure as well as surveyed perceptions of the members involved in the intervened change process.

Post-Salvage Signing Analysis: Qualitative and Quantitative Perspectives

Initially three pronged assessment was made by VA of the XU environment in terms of units on campus, environmental goals of the university as well as the financial goals of the existing internal copy/print staff. Specific figure counts of such things as overall profitability, unit amounts, types, ages and networkability were assessed by the vendor. This stage of development, which took several months of weekly meeting with both parties listening to the client's needs while simultaneously creating a strategic plan, allowed for sufficient healing of the relationship to the point where a feasible scope could be developed.

Subordinate-outlined risks were addressed in several areas including the university's ability to adapt to more environmentally friendly usage patterns, XU's current funding constraints due to the struggling economy and restructuring of existing staff members within the university. A mitigation plan was then included in the contract addressing each of the major risks so that the results would be more predictive. The plan included scheduled phases of XU's progress in embracing the new digitally linked system and the steps that were needed by the university in order to achieve its highest sustainability goal, referred to as a "utility model", where full transfer was made of units. An eminent risk with existing XU-related staff becoming lost in the transition and possibly behaving detrimentally to the agreement was handled by expressly outlining the roles of those employees through the transition period. These roles were clearly defined by the vendor so that the subordinate expertise and utility could be maximized without leaving the school in the dark to figure out what to do with employees that are to be outsourced.

Through this assessment of risks and the university's environment, VA was able to formulate an agreement that addressed three key areas. These were financial, operational and environmental. Within these three fields, several metrics were established by the vendor in order to measure both the initial status of the university as well as its progress throughout the life of the agreement. Also included in this agreement were periodic meetings to assess the contracts overall performance and make adjustments as needed. This type of flexibility would allow for unforeseen events to have a process already set for being addressed.

The rescued contract verbiage was implemented as an amendment which virtually revamped the whole previous document in July of 2010. This modification, which came to be known as the "Super Amendment", consisted of approximately 20 pages of textual and table agreement items.

Other peripheral additions, by legal and corporate level reviewers, included 46 pages of price listings, model descriptions and legalistic verbiage. A summary of the major measurable points of change that occurred resulting from the subordinate empowered model are outlined in Table 1.

Table 1

Project Improvement Model Comparison

CRITERIA	PBC	SEE	CMC	VGS CCP	DMM	ERP
Theory Based	X	X	X		X	X
Applied at Beginning of Modified Contract	X	X		X		X
Quantitative Analysis Established		X				
Draws on Vendor (Subordinate) Expertise to Address Complex Contract Issues		X		X		
Model Inserted in Mid-Contract Period		X				
Impact of Model Assessed		X		X		X

Qualitative Survey and Interview data

Post amendment surveys were created to gauge the newly perceived effectiveness of the salvaged contract's ability to successfully address key areas such as risk identification and mitigation, financial clarity, university environmental awareness goals and measured performance. These queries were given through extensive conversations and interviews with all four head members of the negotiation and operations teams on both Client and Vendor sides. Specific questions were asked to four key participants in the project on the perceived future effectiveness of the salvaged version of the contract as compared to the original created with a more traditional model. These questions covered twelve key areas of project evaluation and outlook to be measured to define the increase in performance. Results of the surveys are summarized in Appendix 1.

Overall, 12 quantitative questions were asked to the administrators where their answers were listed numerically between 1 and 10 (1 being the lowest and 10 the highest). Average scores in the "Before" column total 3.29 which would be considered very low compared to the "After" column of 8.05 showing a substantial increase in scores by 4.76 summarized average. Areas that showed substantial increases were in Scheduling, Operations and Environmental awareness which all had an increase of 5.5 rating points of greater. Other notable references in score increases are found in the categories of financials, performance being measured, risk mitigation and predictability of the outcomes.

Post Interviews and meeting quotes that were taken over the period of the salvage process appeared to be enthusiastic about the increased effectiveness that such a method made. Contrasting the before and after periods of the salvage, one university purchasing executive who

played a part in the previous attempts to save the original contract stated, "If we had run this through another [traditional] request for proposal, it would have failed again…The previous contract was not measurable or sustainable." The vendor's representative of the negotiation process stated that this process allowed both parties to "work together and create a mutually beneficial agreement". He later included the benefits of giving the vendor such freedom and responsibility "removed several key obstacles [in]…navigating through a very difficult process. The end was a predictable contract that holds both parties accountable." The operations representative from the vendor, who participated in the final months of the negotiations, commented that this process was "successful at making [ourselves] write the contract and taking on the risks…" These recorded comments help to verify that such a method of allowing vendors to show their worth in contract creation is desirable and efficient by both the vendor and client.

A final analysis of the five distinct project methodologies is given with a sixth model (being the Subordinate Expertise Empowerment model) inserted for comparative purposes. Areas of comparison include whether the models were theory based, case studied, point of application as well as various means of validation, as shown on Appendix 1. It is worth noting that this comparison demonstrates that only two of six models were actually applied into a live case study where quantitative analysis was taken and only half of the models measured any type of impact of effectiveness.

Discussion

This document was intended to empirically test the hypothesis that a poorly performing contract could be measurably improved upon through the application of a salvage model which emphasizes the subordinate-expert empowerment quality in contract rescue. Results of such a study have shown favorable observations from both the buyer and vendor as the traditional role of each part is altered.

To aid in the review and discussion of the results, a comparative table was created which showed the areas that such a model address in comparison to other reviewed models for contract improvement. Through this appraisal, as shown in Table 1, comparative strengths and weaknesses of each model can be assessed with reference to their ability to measure the effective results of such applications.

Though a variation of the model had been extensively tested with positive results in new buyer-vendor contracts where initial conditions were more strongly controlled, such a test as this paper presents can only be considered as one data point in addressing the vast arena of salvaging contracts that are currently performing poorly.

Further research is encouraged in the area of vendor conducted agreements where this model could be utilized to not only salvage ailing but also refurbish contracts that are not performing as well as expected. This principle may also be elaborated upon in the relationship between a supervisor and subordinate parties in the effort to accomplish tasks at hand where the subordinate party is given greater direction and empowerment based on the supervisory needs.

Conclusion

The purpose of this article was to test the application of a project management model in a case study environment of a failed project. The model emphasized the importance of empowerment of and reliance upon subordinate expertise in managed project environments in order to optimize overall success and performance of ailing systems. The successful achievement of such a test is supported by both the salvage of the agreement as well as the surveyed results of key members of both parties measuring the successful turnaround of such a model. The unique variation of the model from its more common and traditional use is the emphasis of Subordinate-Expertise Empowerment (SEE) where the more full management of project complexities and communication issues are given to the subordinate expert party which consists of the vendor, contractor or other subordinate party that has the most expertise, proximity, time and stake in the success or failure of the project.

The favorable results of such a test help to build further understanding of the application improved managerial practices as they relate to the interactive relationship between supervisory and subordinate members. Of specific note with this empirical study, is the application of having management give further autonomy, trust and empowerment to the to the subordinate-vendor party so that the optimization can occur in a managed environment. The results also help to give the call for further applied tests that help to expand the efficiency, success and paradigm of applied management with more dynamic solutions. (Bosch-Rekveldt, M., et al., 2010; Williams, 1999).

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Appendix 1: Post Contract Signing Survey Results

IDENTIFYING QUESTIONS COMPARING RESCUE IMPACT: PRE MODEL VS. POST MODEL (RANKING 1-10)

1 Identifying Potential Risks in the contract relationship
2 Mitigating of the Potential Risks in the contract
3 Scheduling
4 Expectations of Outcomes in contract
5 Measurement of Performance
6 Baseline
7 Operationally
8 Environmentally
9 Financially
10 Confidence level in moving forward
11 Predictability of future outcomes in contract
12 Agreements ability to be flexible in addressing unforeseen changes of the future

	Bob		**Sam**		**Rick**		**Don**		***Ave.***		***Model Impact***
#	**Pre.**	**Post**	**Pre**	**Post**	**Pre.**	**Post**	**Pre**	**Post**	***Pre***	***Post***	***Pre/Post***
1.	9	8	3	8	1	7	2.5	7	***3.9***	***7.5***	***+192%***
2.	8	8	3	8	1	7	2	7.5	***3.5***	***7.6***	***+217%***
3.	5	9	2	9	1	8	3	8	***2.8***	***8.5***	***+304%***
4.	6	9	3	8	2	8	2	8	***3.3***	***8.3***	***+252%***
5.	6	8	3	8	1	9	2.5	7.5	***3.1***	***8.1***	***+261%***
6.	6	8	2	9	2	9	2	8	***3.0***	***8.5***	***+283%***
7.	6	8	3	8	1	8	1	9	***2.8***	***8.3***	***+296%***
8.	5	10	2	9	1	7	2	8	***2.5***	***8.5***	***+340%***
9.	8	9	2	9	3	9	3	8	***4.0***	***8.8***	***+220%***
10.	8	8	3	8	1	7	3	7.5	***3.8***	***7.6***	***+200%***
11.	4	8	3	9	1	8	3	7	***2.8***	***8.0***	***+286%***
12.	9	4	2	9	3	8	3	7	***4.3***	***7.0***	***+163%***

The Status Quo and Perspective for Improvement of Public Works Procurement Performance in Vietnam

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The public procurement sector plays a vital role in the economic development in developing countries such as Vietnam. However, public procurement activities usually perform poorly. This situation can be attributed to ineffective procedures and system ("hardware") and human resource management ("software"), which occurs at every stage in project purchasing. The poor performance has reduced the effectiveness and efficiency of project delivery in the construction industry, causing delays, cost over-runs, and defects in construction projects. This paper, through working experience and observation by the first author, problems of public procurement were obtained as hypotheses and then validated based on questionnaire surveys and CIS (Construction Industry Structure) model analysis. The survey results indicated a relative correlation with CIS model in description of current construction industry. The study aims to identify issues of public procurement at all stages: pre bid, bid information, evaluation, and award. Based on identified major problems and determined risks, the results are expected to provide a valuable perspective, and thus, to propose necessary strategies to deliver high performance, competition and transparency for the public procurement. In further studies, it is relevant to propose a new model for sustainable public procurement based on the best value approach.

Key words: Public procurement, procurement performance, best value environment, Vietnam.

Introduction

Vietnam, as a developing country, has achieved and maintained a high economic growth rate since the Reform and Opening-up policy in 1986, and is targeted to be an industrialized country by 2020. The construction industry sector has significantly contributed to total growth, and in order to maintain the level of development, the infrastructure system needs to be appropriately erected to serve that development. In practice in Vietnam, the public work investment sector plays a vital role in infrastructure systems such as road transportation networks. Therefore, public works procurement has received much attention in the social community; especially, in low income countries, where there is insufficient budget to cover the infrastructure system investment.

However, in all sectors, public procurement is confronted with many existing problems at all stages of the implementation process. Although public procurement regulation changed substantially in the last two decades, projects delays, budget overruns and poor customer satisfaction are major issues being faced in the period of change. The low-bid system has remained the most popular procurement approach in public expenditure of public authorities. In addition, as a result of the economic crisis in the early 2000s, it has forced bidders to compete harder and offer lower prices. It is reported in other countries that the intense competition and

lowest price have led to overregulation by the clients, resulting in inefficient practices, contractor collusion (Mawenya, 2007), and poor performance regarding productivity (Constructing Excellence, 1994; Egan, 1998), safety, timeliness, and quality (Gardenas and Ashley, 1992; Constructing Excellence, 2011) and low contractor profit margins (Drew, 2011;Kashiwagi et al., 2012). Also, Lowest bid is attributable to poor wages and working conditions and low environmental standards, thus declining the quality and sustainability of products and services (ClientEath,2012). Vietnam is no exception. At the same time, many users of facilities have witnessed poor performance of contractors procured through the low-bid process.
Public procurement has two characteristics as a game. First, as players, buyers (clients) and sellers (constructors) are willing to join in a bid game where the both players pursue their individual objectives. In this game, if procurement scheme cannot balance multiple objectives, then an equilibrium scenario is not formed to the stakeholders. Second, the rule of this game is determined and operated by the public client side. Thus, the public client side is responsible for whether the above mentioned equilibrium is formed or not. However, in other countries, the public client side has not necessarily been successful in fulfilling this responsibility. In many cases the public client uses lowest bid price approach to fulfill accountability of cost efficiency and fairness associated with contractor selection. The low bid process may result in a large number of problems, including project delays and budget overruns (Flyvbjerg et al., 2007; Illia, 2001) that cause poor performance of the construction industry (Kashiwagi et al., 2004). These poor performances of projects reduce the growth of construction industry, and consequently impede the development process. In summary, the game of public procurement is not necessarily designed and operated successfully in other countries.

Measures to improve this game have been intensively discussed and practiced. Education of owners has always been an issue. That is, the owners' low bid mentality and lack of education are perceived as problems in the construction industry. It requires a drastic change of paradigm and concepts from traditional practices to move from price competition to best value environment. The best value approach is efficient, effective, minimizes communication and flow of detailed information, creates a "win-win" scenario, the highest possible value at the lowest costs, high vendor profit and minimal project cost and time deviations (Kashiwagi et al., 2012). Japan has also made many efforts to improve the game of public procurement (Watanabe et al., 2012).

In Vietnam, studies on public procurement have just started. Thus, this paper aims to identify the root causes of poor performance of the public works procurement. The analysis of the problem pattern of public procurement process is expected to provide valuable awareness, and thus, ensure that potential strategies are being proposed to improve the performance, competition, and transparency in public work procurement in order to achieve the best value environment. In the further studies, a new scheme for sustainable public procurement is relevant to propose based on practical condition of Vietnam.

Methodology

Based on both working experience and observation by the first author, problems of public procurement were obtained as hypotheses. The validation, solid identification of hypotheses problems, consists of literature reviews, additional observation of existing conditions and 15

complete packages of road and bridge in Vietnam, and the questionnaire surveys. A total of 219 sets of questionnaires were sent out between February 2014 and March 2014. The data collection was conducted by e-mail survey and personal survey via face-to-face interviews. Follow-up telephone calls were made to remind and urge the participants to respond to the survey. A total of 124 responses were received – about two-third were submitted via e-mail and another one-thirds were verbal responses to the first author. The response rate of 57 per cent exceeded the expected range of 25-40 per cent for surveys of this type (Furtrell, 1994).Other sources that support this view include Takim et al.(2004) which reported response rate norms for postal questionnaire surveys to be 20 – 30%. 124 respondents of stakeholders were working for public client offices (40 respondents), constructors (53 respondents), consultants (19 respondents), and academia (7 respondents) and 5 other respondents. The Construction Industry Structure model was then employed to explain the current Vietnamese construction industry characteristic.

The Significance of Public Procurement Improvement

Public procurement is not only a purchase process; it is also the crucial pillar of the national economic structure. Through the procurement process, monetary value is conveyed to infrastructure assets. The survival of governments must be based upon its ability to maintain public trust and to do so in a cost effective manner (Connell et al., 1998). Procurement seems to be the process with the largest impact on Cost, followed by Design, Construction, Operation, in descending order (Gardenas and Ashley, 1992). Therefore, an effective and efficient procurement scheme plays a vital role in guaranteeing optimal monetary utilization and quality product achievement. Whereas, a poor procurement process contributes to poor performance of public works such as over budget, time delays, and not meet quality specification.

Procurement position plays a crucial joint in the string of project life cycle (Fig.1). Through this phase, clients and potential bidders can be contracted with each other in a long process to construct the certain works.

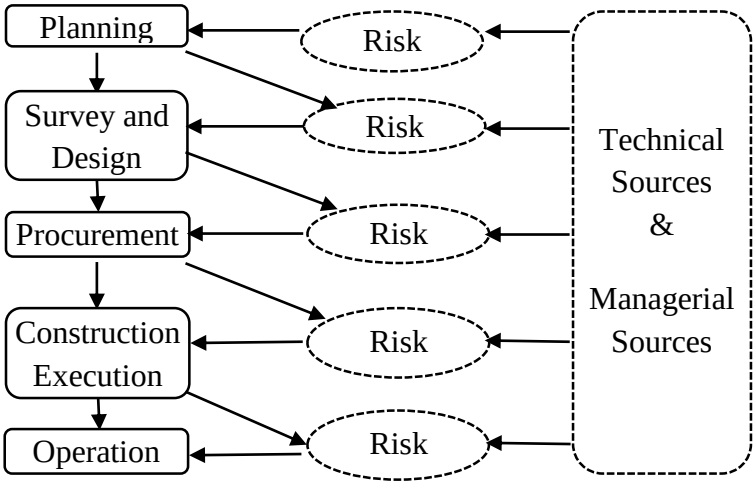

Figure 1: Risk sources in project life cycle

Given project life cycle processing, risks are generated by both technical and managerial sources of the preceding phase that affect directly the succeeding stage. The technical risks are identified through activities such as planning quality, developing design document, preparing request for proposal, studying construction plans, and operating the process during project delivery. At the same time, managerial risks are made as a result of human's biased decision-making on each phase due to insufficient information, unaccountability, inappropriate direction, improper management, inadequate control, and unnecessary intervention. Decision making happens in each constituent part, and almost decision is obtained by uncertainty associated with further events; risk is typically intrinsic in projects. Project decision-making occurs in the perspective of the project stakeholders (Edwards et al., 2005).

Hence, identification and their classification into either technical sources or managerial sources at the procurement stage are important. The risk identification and classification at the procurement stage becomes a foundation for appropriate risk management. They also contribute to stopping increase in the risk transferred from the previous stages and minimizing the risk left for the following stages of the procurement.

Over the last two decades, of 80s and 90s, the predominant procurement process in construction has been the competitive 'low-bid' procurement process, encouraging an increase in the pressure on price, proliferation of construction systems and products to meet the minimum specifications (Kashiwagi and Byfield, 2002). Since beginning 2000s, many countries have been endeavoring to reform the public procurement by enacting a great deal of regulations on that. According to Larasati and Watanabe (2010), reform process should be concentrated on range of factor following:

- Reform process encompasses several stages
- Reviewing existing problems in the first step of framework development of reform process
- Reviewing existing issues through historical approach is one of necessary method
- Tools should be created for implementation is an effort to improve performance
- The objective of reform process in to improve the value of public investment

Based on the above mentioned process, first of all, existing issues should be explored and explained then strategies proposed in further.

Existing Major Issues of Public Procurement Performance in Vietnam

As previously mentioned, public infrastructure works play a vital part of the construction industry and GDP growth as well. Infrastructure investment in Vietnam annually account for 9-10% GDP (Alfen et al., 2009); however, both World Bank and Asian Development Bank advised that investment in infrastructure should be increased to 11-12% of GDP in order to maintain the current growth rate (Lovells LLP, 2009). It indicates that there is a strong connection between infrastructure investment and Vietnam's economic growth.

The investment budget of construction works by Vietnamese government during fiscal year 2008 to 2012 is shown in Figure 2. The data indicates that the construction industry had increased gradually during the period of five fiscal year observation. It is also expected to increase in following years.

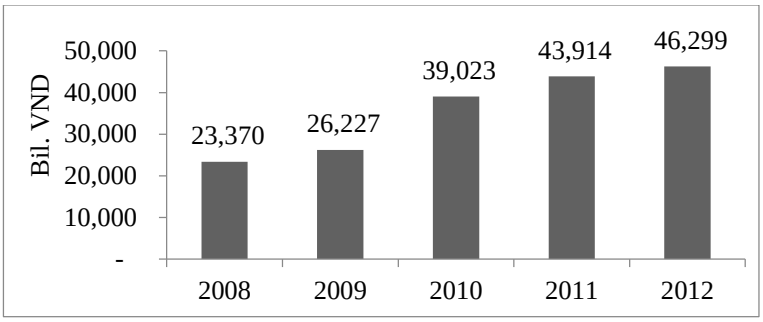

Figure 2: Construction investment by Vietnam government during FY 2008 to 2012 (Source: General Statistical Office of Vietnam 2012)

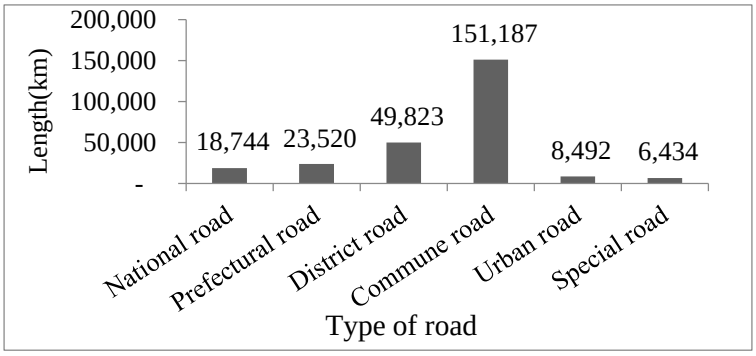

Figure 3: Vietnam road network 2011 (Source: Transport Development & Strategy Institute, 2013)

Regarding the transportation sector, its investment requires 4.1% of GDP per year (Alfen et al., 2009). The total current length of road networks in 2011 in Vietnam shows that most of road type is ongoing erected to support the development process (Fig. 3). According to the report of Transport Development & Strategy Institute of Vietnam, a budget is required about 1.619.226 billion VND (approximately 77 billion USD) in ten years investment from 2010 to 2020, attributing to about 202.308 billion VND per year on average (approximately 9.63 billion USD per year), as seen in Figure 4.

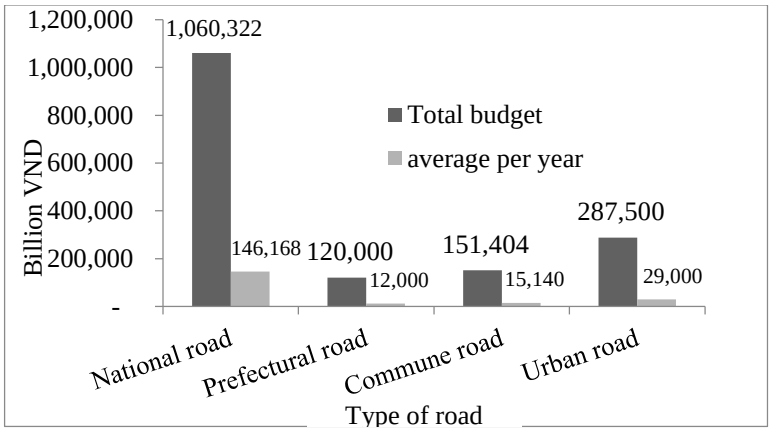

Figure 4: The capital demand for road networks development in Vietnam until 2020 (Source: Transport Development & Strategy Institute, 2013).

The data indicates that a great amount of budget for the national road networks investment such as highway express is needed during the decade by 2020. Vietnamese government has approved an estimated 2,160 km of the new highway projects as part of a national Transport Master Plan, being built between 2008 and 2020 (Italian Trade Commission, 2010). So far, public share has regularly played a major role in financial resources for these investment; actually, budget for transportation infrastructure development accounts for 98% of the total capital expenditure in the last decade (Alfen et al., 2009). Therefore, Vietnamese government has a very strong commitment to develop and modernize the national transport infrastructure systems since it is believed that such development will noticeably support the economic growth.

On the other hand, corruption is always a threat to the infrastructure projects, especially in developing countries. Public procurement sector typically accounts for the largest share of public expenditures aside from government salaries and social benefits. This massive spending goes, in large part, to essential public services such as clean water, education, healthcare and infrastructure. However, it is estimated that corruption can add 10-25 percent to the cost of public procurement, and in some cases even 40 to 50 percent; as a result, the potential financial and social costs are staggering (Transparency International, 2011). That problem was also confirmed by World Bank in the report stating that "Corruption is so common among state agencies, state officials, citizens and firms, between employees of public services and customers, and the people are concerned" (World Bank, 2013). The construction sector was ranked 8th in terms of most corrupted sectors in this report. Corruption not only impedes the economic growth, but also reduces public works procurement performance, competiveness, and transparency.

In practice, a number of regulations on public procurement have been enacted by Vietnamese government in the two last decades (Fig. 5), and some of drafting guidance law has been discussed to publish in next time. However, the regulation namely "public procurement" has not ever been issued so far; it was the tender regulations instead, and these rules were adopted as the public procurement law. Although first regulation was launched in 1989 (Fig.5), there was not any comprehensive and open competitive bidding regulations until 1994. The founding process

of a modern procurement framework for public expenditures, based on principles of competitive bidding, was begun after the first procurement review in 1994. The regulations were separately developed for capital investment and recurrent expenditures. On the capital investment works were done under technical assistance grants provided by World Bank and Asian Development Bank (ADB). Given those assistances and hands-on experience, the regulations have steadily improved. As requests of the National Assembly, under conducting of the inter-ministerial members group led by the Ministry of Planning and Investments (MPI), tender regulations have been severally issued then revised and substituted since they were first formally enacted in 1996 (Fig.5). The latest regulation is the Tender Law imposed in 2013 which substitutes the prior existing regulations. The latest Law shows some significant improvements in comparison to the first regulation imposed in 1989, making the tender procedures more detailed and approaching to internationally common procedures.

Objectives of the tender law confirmed in its commencement statement are to guarantee four bidding principles including competitiveness, fairness, transparency, and efficiency. The Law also provides for a number of different procurement methods described as follows. Firstly, open competitive bidding is compulsory for most of procurement of goods, works, and consulting services above certain financial thresholds; and there is no restriction on the number of participants. Secondly, designated competitive bidding, which requires a direct invitation to at least five candidates, can merely be utilized in one of the following situations: (i) The procurement is for a research or an experimental nature and only a few bidders have the capability to implement; (ii) under the requirement of the foreign donors; and (iii) the highly specialized procurement. Thirdly, appointed bidding which is used as the given special circumstances for goods, works, and consulting services that require urgent action to respond to an event of force majeure; or involve goods or services from a supplier that cannot be switched to other suppliers due to the technologically compatible requirement; or involve the national security and energy security. Additionally, the appointed bid can solely be employed for procurements below certain financial thresholds. Finally, the special cases may be applied if none of those methods could be used and it also needs to get the approval of the Prime Minister.

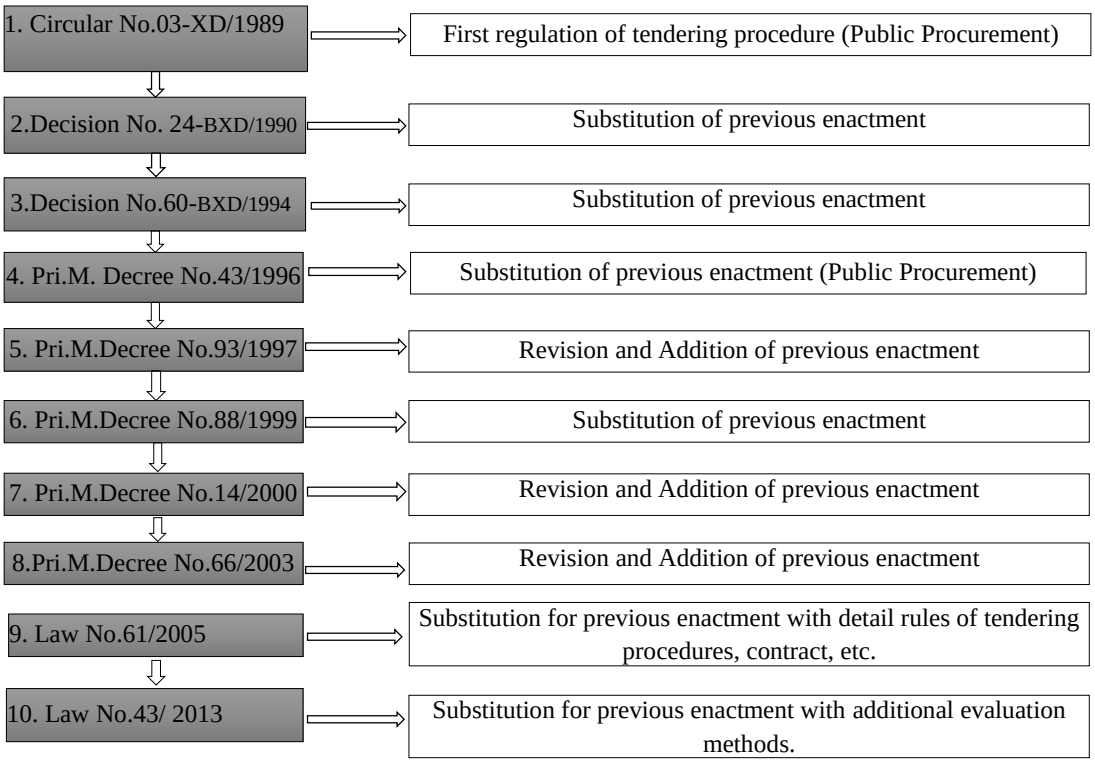

Figure 5: Changing procedures of public procurement regulation in Vietnam.

Table 1 shows results of the questionnaire survey. Summarizing results of this survey, the above stated four objectives of the procurement law are not considered to be achieved. Main problems usually result from insufficient promulgation of tender regulations form, inappropriate bid scheme, unpractical evaluation method, insufficient responsibility fulfillment by each level of management in each organization, and insufficient public information disclosure. Law 2005 first introduced an unique evaluation method was the price based on "an equal footing basic" in which multiple criteria including that technical and commercial evaluations are converted into the total price proposal; however, it appears to be unpractical.

In addition, the latest tendering law offered two more evaluation methods, namely "lowest price based" and "technical criteria combined with financial criteria based weighting." Here two survey results should be noted. First, 82% of respondents agree to the problem statement of "Difficulty to receive the RFP due to obstruction in the case of collusion." This shows that collusion phenomena are prevailing. Second, 85% of respondents agree to the problem statement of "Poor quality of Request for Proposal." This hints that RFP gives ambiguous introductions and poor definition of evaluation criteria. Thus, the low bid method has been the most likely employed in bid processes. As for another actual concern, a comprehensive evaluation method, in which multiple criteria are effectively inclusively evaluated, has not been defined by the existing tender regulations; consequently, clients could not have the legal frame to implement that method in the Request for Proposal and evaluation. Therefore, bid decisions are usually based on lowest price; as a result, the awarded bidder is forced to make high profit margin by

providing cheapest construction services or making more claims as much as possible. Subsequently, poor public works performance is a natural consequence.

In order to capture issues visibly, the open competitive bidding process is described in Figure 6. It can be seen that most of stages of public procurement process have specific problems caused by both involved stakeholders (software) and structured system (hardware). There are the following issues at each stage. In the following section, each specific problem is discussed.

Table 1

Summary of survey results

ID	Questions	Agree	Disagree	Others
1	Difficulty to receive the RFP due to obstruction in the case of collusion	82%	18%	0%
2	Poor quality of Request for Proposal	85%	14%	1%
3	Lack of independent and trustworthy reference information of contractors.	83%	15%	2%
4	Low trust between client and constructor in bidding process and execution	77%	18%	5%
5	Information of projects is not provided conveniently.	71%	28%	1%
6	Prevailing collusion is a cause of low competition.	81%	18%	1%
7	Many poor design document is still an issue, resulting in change orders during construction	87%	12%	1%
8	Past performance of constructor is still not considered/ or ineffectively evaluated	89%	10%	1%
9	Risk assessment plan of constructor is still not considered effectively	83%	16%	1%
10	Key persons of constructor are not effectively and efficiently considered.	89%	10%	1%
11	Sub-constructors and suppliers are still not evaluated appropriately and efficiently	76%	22%	2%

Lack of Information Reference Systems of Bidders

83% of respondents agree to the problem statement of "Lack of independent and trustworthy reference information on contractors." The capacity and past performance of candidates cannot be effectively and conveniently verified. Consequently, in practice, qualification of each bidder is only judged from documents submitted in each bid proposal. In addition, the qualification documents submitted, which includes only a financial statement confirmed by a private audit firm and a list of completed contracts in the past, is not assured by any bid bond or a third party. It implies that contents of most qualification documents are questionable and that clients cannot effectively verify the capacity, experience and performance of each bidder. Thus, 77% of

respondents agree to the problem statement of "Low trust between client and constructor in bidding process and execution."

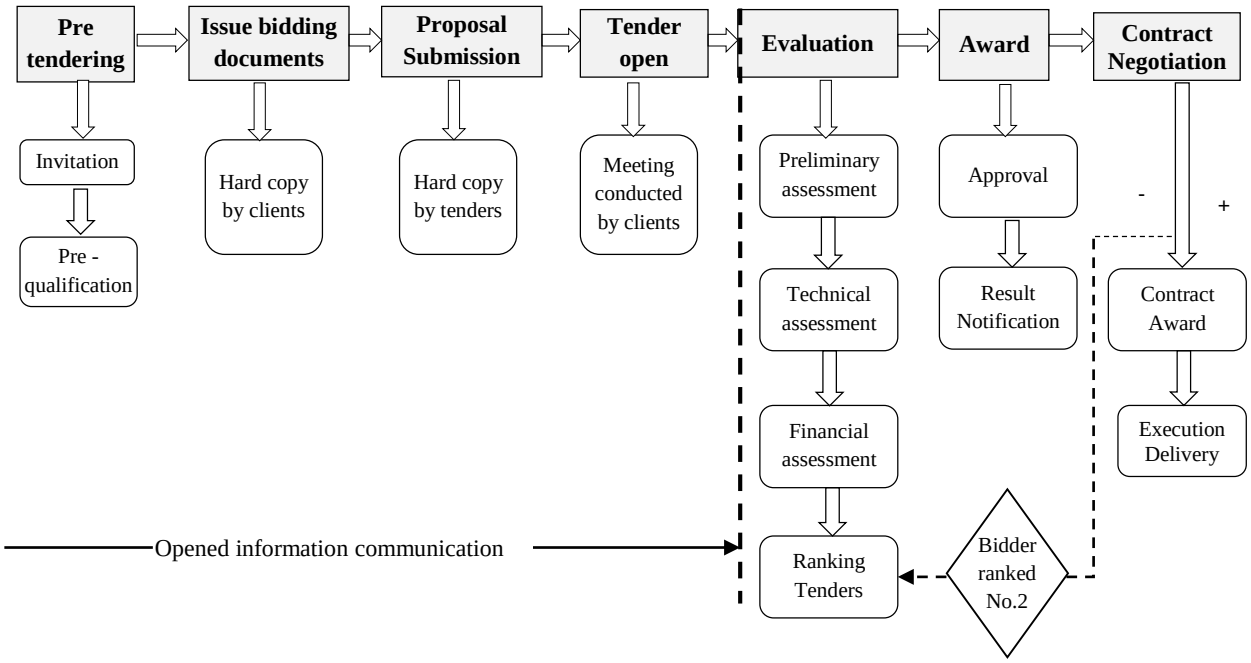

Figure 6: Open competitive bidding process in Vietnam

Designated Competitive Bidding

The designated competitive bidding is conducted in most projects even if a project is announced an open competitive bid. As mentioned above, the law offers a certain number of selection methods including open competitive, designated competitive, negotiated, and purchased biddings; however, 81% of the respondents agreed to the problem statement of "Prevailing collusion is a cause of low competition," that is, the selection mechanism is attributed to an "easy" practice of less competitive approaches involving collusion. Given such a restricted competitive environment, only candidates who have good relationship with clients or top management positions of public authorities can participate in certain bids. Furthermore, there is one important survey result. 82% of respondents agree to the problem statement of "Difficulty to receive the RFP due to obstruction in the case of collusion." This behavior means that the public client makes pre-bid information unavailable to certain bidders including bid invitation information and Request for Proposal document. These techniques preventing open competition are widely employed. As a result, the open competitive bid approach is certainly not competitive enough because bidders can be successful by having a good relationship with the client rather than improving their competitive capacity. Therefore, practices of restricted competition are conflicted with stated objectives of the law.

Lack of Transparent and Convenient Information System of Bid Process

71% of the respondents agree to the problem statement of "information of the certain projects is not provided conveniently." The adequate and timely notification of bid opportunities is a cornerstone of transparency in procurement. Moreover, information publication and openness in regulations should be available in not only the tender announcement but also the myriad of other contents such as evaluation criteria, scoring criteria, and evaluation method. In addition, the "ceiling price" of bid packages, public engineer's price, is also kept confidential during bid screening; as a result, bidders usually tend to exploit the package's price information from clients or client's representatives. Naturally, the more confidential clients keep information the more curious bidders exploit; consequently, that lack of transparency is also a source of bid collusion and corruption.

Here it should be worthwhile mentioning Japan's experience. Japan has been suffering from the same unfair activities associated with confidentiality of the ceiling price. Thus, many local governments disclose the ceiling price before the bidding. Some governments even disclose the lower limit on contract value. These measures are certainly effective to reduce corruption; however, there is a side effect. Most of bids concentrate on or around the lower limit; thus, a winner is often determined by tossing a coin. This measure may be hindering development of truly excellent constructor; however, an epoch making measure to prevent unfair behavior and promote truly excellent constructor has not been found yet (Watanabe et al., 2012). There seems no almighty measure. Depending on the history and the current practice of procurement, a most suitable measure should be carefully discussed, derived, implemented, and modified based on the implementation results.

To be transparent in information communication, not only should all the disclosure information requirements be satisfactory; but also such requests should be publicly explained to candidates during bidding process. However, the provided interpretations to unsuccessful bidders, for example, are insufficient to clarify the reasons. Therefore, the obvious accountability stakeholders in the bid information justification should be confirmed by regulations in order to warrant the transparency and the objectivity of all bid information.

Poor Quality of Design and Request for Proposal document

87% of the respondents agreed to the problem statement of "poor design is one of major issues, which causes frequent change orders during the executing period." This becomes a fundamental reason that awarded constructor makes many claims for supplement works. As a result, the actual cost usually exceeds the initial budget of packages; consequently, budget is forced to adjust additionally after completion of works.

In addition, the Request for Proposal (RFP) document is regularly developed by consultant firms. However, risks appeared when the consultant has insufficient capability. In fact, as 85% of respondents agreed to the problem statement of "Poor quality of Request for Proposal," most of consultant firms have inadequate capability causing the poor RFP document. Certain RFP documents are completed without appropriate constructing technologies, specifications, and

effective standard. Consequently, those poor criteria cannot be an accurate judgment function to assess competitors. As a result, the poor design document and the poor Request for Proposal are the critical sources and causes of change orders and supplementary work claims during construction delivery.

Issues of Bid Evaluation

Bid documents, in principle, disclose the method of bid evaluation and contract award criteria. The award criteria for goods and works are (1) minimum requirements fulfilled; (2) lowest "evaluated price"; and (3) proposal price not exceeding pre-bid estimate (ceiling price). However, the ambiguous term of "evaluated price", which is defined as the bid price after errors correction, deviations adjustment, and then the conversion of technical, financial, commercial criteria and others to make bids comparable, has not been practical or feasible. The inapplicability of the "evaluated price" technique is caused by an insufficient clarification in the Request for Proposal document. Therefore, in practice, assessors cannot apply the "evaluated price" technique even if it is ruled by the Law. Actually, the technical evaluation score is not obtained by its relative importance to price evaluation score. Generally, the lowest price proposal is awarded among those who satisfy the minimum of the technical requirements.

In addition, 89% of the respondents agree to the problem statement of "Past performance of constructor is still not considered/ or ineffectively evaluated." Quality, schedule over-run, warranty activities, and past client's claims are not assessed in qualification screening or in-depth assessment stage. The lack of past performance criteria evaluation is partly as a result of the untrustworthy references information of candidates. In other claims, 83% and 89% of the respondents also agreed to the problem statements of "the risk assessment plan and superintendent assessment are still not considered or ineffectively evaluated in the evaluation process, respectively." In fact, those criteria are not critically required in the Request for Proposal document. Consequently, those inadequate criteria consideration become a major cause of poor potential project performance such as time overrun, exceeding budget with change orders, and unfulfilled quality expectations. Therefore, a winner is substantially determined based on the lowest price. Furthermore, the evaluation process is not transparent enough to both bidders and communities who can straightforwardly monitor the process in order to confirm its transparency, equality, and award result as well.

Lack of Effective Sub-constructors' Performance Consideration

76% of the respondents agree to the problem statement of "sub-constructors' performances are not effectively and efficiently evaluated." Moreover, there is a poor quality control mechanism between prime constructor and sub-constructors after bid award such as insufficient quality control on constructing site and third-party supervision. As a result, the prime constructors liberally make multi-tiered subcontracting to just ease their financial conditions without paying much attention to quality management on site. Sub-constructors with poor experiences, capabilities, competencies, and responsibilities could be hired. The poor sub-constructor constitutes directly to the poor quality public works. In fact, those poor sub-constructors' performances evaluation is caused by not only inadequate quality assurance regulations, but also lack of sub-constructor's evaluation criteria.

Given stated issues above, problems of tender scheme and Accountable stakeholders are summarized in Table 2.

Table 2

Problems in public procurement process and Accountable stakeholders

ID	Stages	Major problems	Accountable Stakeholders
1	Pre-bid	- Poor design document - Lack of independent and trustworthy references of bidders - Bid collusion	Government and Clients
2	Bid information	- Inconvenient available information. - Ineffective criteria evaluation - Sealed up the "ceiling price"	Government and Clients
3	Request for Proposal document (RFP)	- Poor quality - Minimum of specification requirements - Lack of effective evaluation criteria	Client and Consultant
4	Evaluation method	- Many evaluation methods proposed inapplicably - Predomination of the price based method - Lack of the effective comprehensive method - Lack of past performance consideration - Lack of the risk assessment plan consideration - Ineffective superintendent evaluation.	Government, Client and Consultant.
5	Post award	- Poor performance of Sub-constructors. - Insufficient fulfillment of bid proposal commitments. - Claim for change orders	Client, consultant, constructor.

The current situation proves that Vietnamese Construction Industry is classified in Quadrant- I, and occasionally, in Quadrant IV in the Construction Industry Structure, as seen in Figure 7.

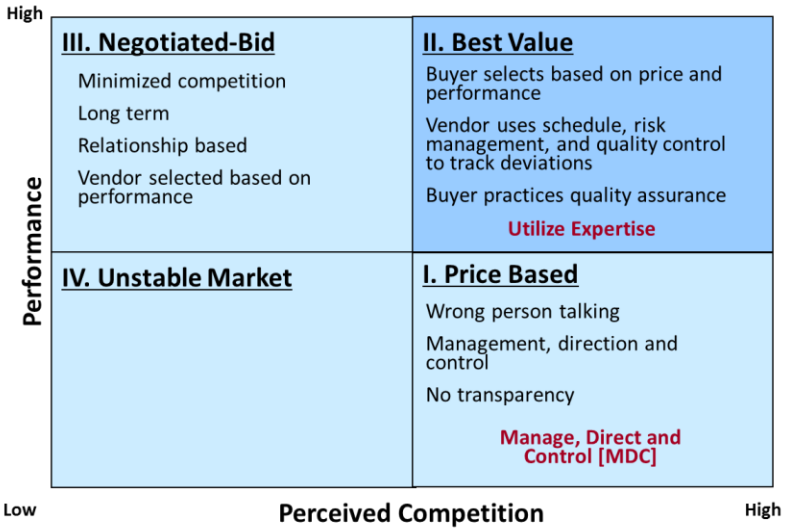

Figure 7: Construction Industry Structure (Kashiwagi, 2014)

Strategies for Improvement

Through analysis above, and the major issues in the public procurement are investigated, these issues could be classified in two sources, the first one belongs to technical aspects (hardware) and the other one comes from managerial aspects (software) (Fig.8).

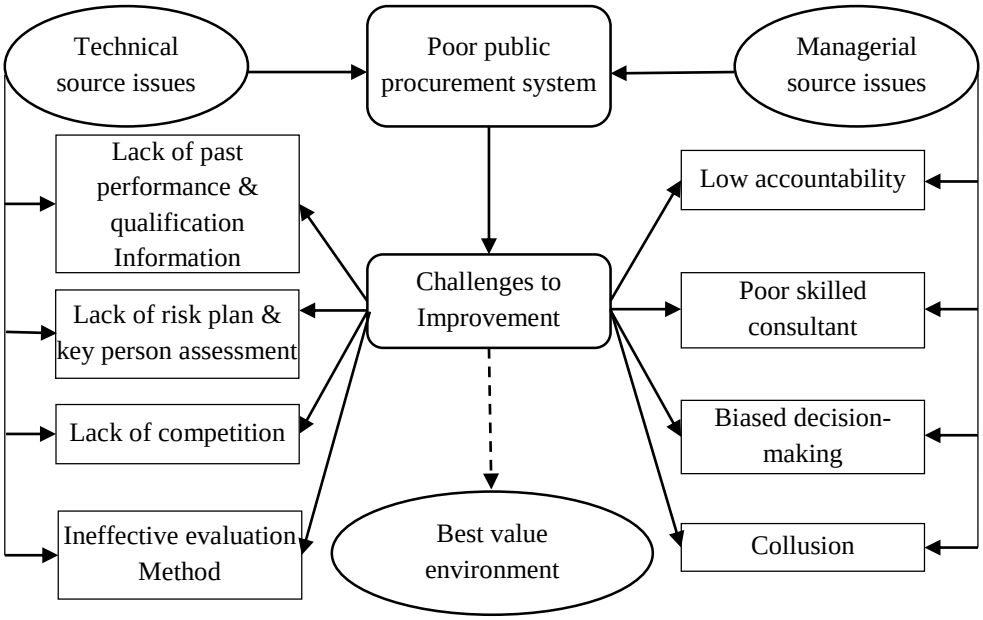

Figure 8. Risk structure of public procurement

Based on the existing identified issues of the public procurement; essential strategies are made for reforms that could be expected to address the above issues and improve current performance, competition and transparency. It is recognized that resolving all would require radical changes; which needs a move away from perception of based solely on price to alternative procurement systems under best value environment. The suggestions put forward include:

1. Building a bidder classification system with appropriate criteria provide greater efficient way of weeding out incompetent contractors during the qualification stage. Assessors can conveniently and authentically reference the specific constructor's capacity that is conforming to project requirements and project classes as well. Constructors should be clustered and stratified into various classes. These classes are taken into account on capacity, capability, and competence including technical profile, financial position, specific field operation, and past performance.

2. Past performance of bidders needs to be evaluated and given a substantial weight in the selection process. Furthermore, the past performance criteria should be effectively updated after completing works. Subsequently, it should be kept records and incorporated in a developing register of constructors' past performance. The past performance register

can be efficiently reused in the next procurement cycles as a way of giving an incentive for improving performance to gain continuity of works for contractors, reducing tender costs.

3. Current capability associated to risk assessment plan document and superintendent positions should be obligatorily considered in the evaluation process. The potential identified risks of project performance understood by the project managers are expected to minimize during execution. As a result, works can be conducted by expert vendors who control the risks. Consequently, clients would not have to manage, direct, and control vendors excessively.

4. Bid information of projects including invitation, price, criteria, and evaluation method should be available to the public during the bidding process. The accessible information creates a transparent environment in which all candidates have access to better opportunity to compete and inspect the bid process. In addition, given the sufficient information provided, bidders' decision-making is effectively made for bid proposal. Given such available information, there is a less room for collusion.

5. To ensure that all criteria are considered, an effective and efficient comprehensive evaluation method should be applicably introduced as the core approach to achieve high performance and competition environment. The structure of evaluation method has to be methodically defined by determining criteria metrics and measuring appropriate importance of criteria. At the same time, as given effectively structured selection method, biased decision-making of stakeholders is mitigated and competitive environment is nurtured.

6. The accountability of stakeholders should be evidently explored and appropriately situated to not only procurement process but also other stages of project life cycle. Accountability is also dynamics to generate high trust among stakeholders in project delivery.

Conclusion

An effective public procurement scheme delivers high performance and competition for the construction industry, which significantly contribute to maintain the economic growth and to reduce corruption efficiently. However, in practice in Vietnam, the analysis conducted through survey results and CIS model adopted, it suggests that the public procurement under the price based environment has performed poorly and threatened not only value of public investment but also stability of the construction industry.

In order to achieve the best value environment, the construction industry performance needs to be radically improved through reforming public procurement process. Some ideas and suggestions proposed in both technical and managerial sources are in agreement with the best value approach which realized to value for money of bid and offered high industry's performance.

Beside the adaptation of successful lessons learned from other countries, a new procurement model proposed has to be tailored the particular local circumstance. Procurement method applied therefore should be given more insight concerning cultural characteristics such as nation, industry, and project level. Such cultural issues are relevant to further investigation, by which the mutual influences between performance criteria and project culture dimensions can be more accurately determined.

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Price Based Environment of Design and Engineering Services

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Design Services have not met the value and expectations of the clients and their project managers. A previous research project studied the impact of the price based award environment on construction practices, and this research proposes that designers' current practices and expectations are also price based and not performance based as perceived by many due to the qualifications based system [QBS] approach. The authors also propose that the qualification-based system [QBS] is a price based system and should be replaced by a best value approach, which includes a best value selection process such as the Performance Information Procurement System (PIPS.) The proposed design model will give control and risk management capability back to designers by having the designers utilize expertise, create transparency utilizing a weekly risk report (WRR) and a risk management plan (RMP.) The new model utilizes the expert's expertise to create transparency, giving the advantage to the higher performing professionals. The researchers interviewed over 400 professionals to validate the concepts of the best value approach for the design community.

Keywords: Qualification Based System [QBS]; Best Value; Performance Information Procurement System.

Introduction

There is a great deal of inefficiency throughout the A/E/C (Architectural, Engineering and Construction) industry (FMI et al. 2010). Many believe the design professional to be the major source of risk and inefficiency, ultimately leading to poor delivery of construction services (Tucker, 2003, FMI et al. 2005). However, there may be multiple issues causing poor performance throughout the design and construction industry (Rubin, 2005). One of these issues may be the procurement system itself (Sullivan, Kashiwagi, & Kashiwagi, 2009).

Since the enactment of The Brooks Act (Public Law 92-582 for Federal Procurement) in 1972, the majority of A/E design services, for public projects, have been procured through QBS (Qualification Based Selection). Qualifications have led to minimum requirements and non-transparency resulting in a price based environment.

Information Measurement Theory (IMT) has been developed over the past 20 years (Kashiwagi, 2014), it explains the reason for the issues being experienced in the A/E/C industry. IMT identifies that natural laws govern reality. Some of the natural laws include:

1. Every event (anything that takes time in reality) starts with unique initial conditions and ends in unique final conditions.
2. The unique initial conditions are always related to the unique final conditions.
3. Over time, natural laws show how the initial conditions turn into the final conditions.
4. It is easier to use hindsight to identify how the initial conditions turned into the final conditions.

Another model, the Kashiwagi Solution Model (KSM), identified the characteristics of a transparent environment (Kashiwagi, 2014). A transparent environment is one where:

1. Things are simple and clear (everyone can understand or see the future outcome).
2. Decision making is minimized due to the ease of understanding or seeing the future outcome.
3. Different entities can be easily differentiated.

By definition, in a non-transparent environment the following conditions exist:

1. Relationships are very important.
2. Performance metrics are not used.
3. Decision making is increased.
4. Management, direction and control are used to minimize risk.
5. Expertise is not utilized and expertise does not have sustainable value.
6. Experts are treated as commodities.

IMT and KSM are the basis of the Best Value (BV) approach. The BV approach development has the following characteristics:

1. 21 year research program.
2. $13.5M funding.
3. 1700+ tests of the principles.
4. 98% customer satisfaction rate.
5. Testing in 31 states in the U.S. and 5 different countries besides the U.S.

Based on the concepts of IMT, KSM and best value research, the traditional AEC environment is not transparent. The environment is not conducive to increasing the value of the AEC expertise. Relationships and trust between clients and vendors are very important. Clients will utilize management, direction and control of the AEC services to minimize the risk of nonperformance. The AEC vendors will become more reactive, utilizing relationships to obtain projects. Accountability will be minimized. These movements will commoditize the AEC industry.

Problem Statement

By observation and documentation, the delivery of design services through QBS (Qualification Based Selection) does not always deliver the most expert and performing consulting design professionals. The authors propose that the procurement process itself may be the cause of poor designer/professional engineering performance (Sullivan, Kashiwagi, & Kashiwagi, 2009). As a

result, design professionals are not being held accountable for delivering designs that meet the expectations (on time, on budget and minimized change orders) of the client (Touran, 2006; Tucker, 2003). Design performance has deteriorated, has not met the expectations of the client/user, and has minimized the professionalism and importance of designers (FMI et al. 2010, FMI et al. 2005, Egan 1998, FMI et al. 2004).

Hypothesis

Owners can improve design and construction performance by improving the selection and delivery process of professional services. Design professionals (DP) need to move to a best value environment to increase the value of expertise, professionalism and performance. The current QBS environment for DPs is an inefficient, price based, and relationship based environment.

Methodology

To validate the hypothesis the following steps will be performed:

1. Research literature to verify inefficiencies of existing conditions and how those inefficiencies hamper the design professional's performance.
2. Use deductive logic to demonstrate that design professionals currently work in a price based environment and need to move into a best value environment.
3. Validate the concepts of IMT, KSM and Best Value by conducting a survey amongst A/E/C Professionals.

Confirming the Price Based Environment of Designers

In today's construction industry, design, engineering, and construction entities have become commodities, which are often misaligned. The selection of the lowest responsible bidding contractor has increased the risk of the client/owner (Kashiwagi et al. 2004, Sullivan et al. 2006, Sullivan et al. 2009). Owners try to protect themselves by employing legal representation. Facilitators, mediators, arbitrators, judges, juries, special masters, and neutral advisors are also often major players of a project. Indemnification provisions are longer than the scope of services in some service agreements. The party least prepared to control risk is often contracted to do so (Berman, 2003).

A second problem with today's professional design environment is that it is relationship based and not performance based. Architects and engineers are often hired based on relationships. In 2007, SMPS conducted a survey where almost 60 percent of the respondents said that key client relationships are in jeopardy if a particular staff member retires or leaves. Relationships are important to owners and architects, resulting in AIA contracts protecting and preserving relationships during disputes (Berman, 2002).

A third issue in today's design-construction environment is that architectural, engineering and contracting services are being treated as commodities (Mrowiec 2003, Markus 1997, Serant 2003). For example, Maricopa County (Arizona) has considered changing its procurement code. The proposed amendment of the Maricopa County Procurement Code of September 2009 would

consolidate procurement functions into the Department of Materials Management where commodities are purchased. J. Burnett (2009), Executive Director of ACEC of Arizona, stated, "What this means is, if adopted, 'procurement' for engineers, architects and contractors would go through Materials Management…" ACEC of Arizona is adamantly opposed to taking the procurement of professional engineering services from the engineering experts and placing this function in the hands of procurement officers who buy commodities."

The Construction Industry Structure (CIS)

The construction industry consists of project owners, contractors and design professionals. The Construction Industry Structure (CIS) (Figure 18.1) segments any industry based on performance and competition.

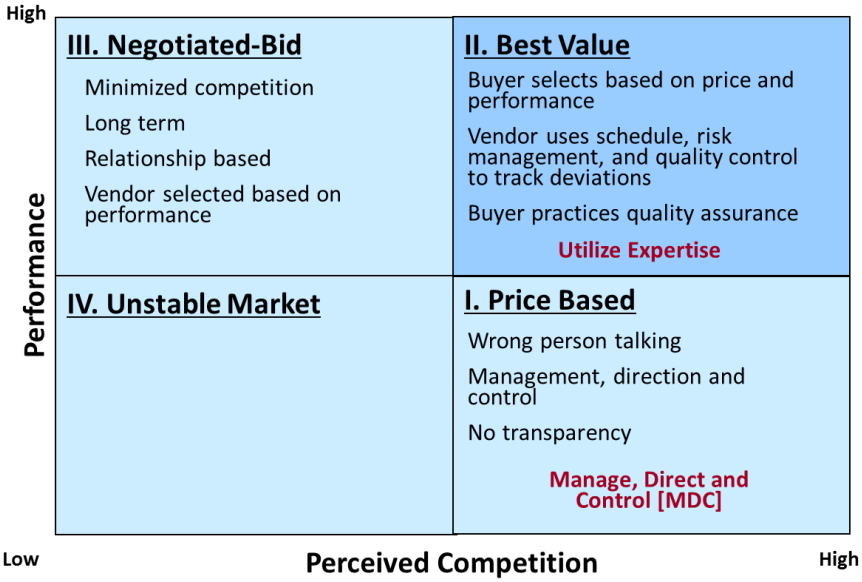

Figure 18.1: Construction Industry Structure (Kashiwagi, 2014)

The price-based environment includes the following characteristics (Kashiwagi, 2014):

1. Projects being awarded based on price, relationships, and the designers/contractors being perceived as commodities.
2. The client's representative directs and controls both design and construction.
3. There is no transfer of control and accountability to the vendors.
4. Designers use minimum standards to identify requirements.
5. The minimum standards are turned to maximums by the vendors due to the price-based environment and driven downward by vendors (Figure 18.2).
6. Vendors become reactive and do as directed.
7. Contractors who utilize expertise, manage and minimize risk and who are the better value when considering total project cost, become less competitive (Figure 18.3).

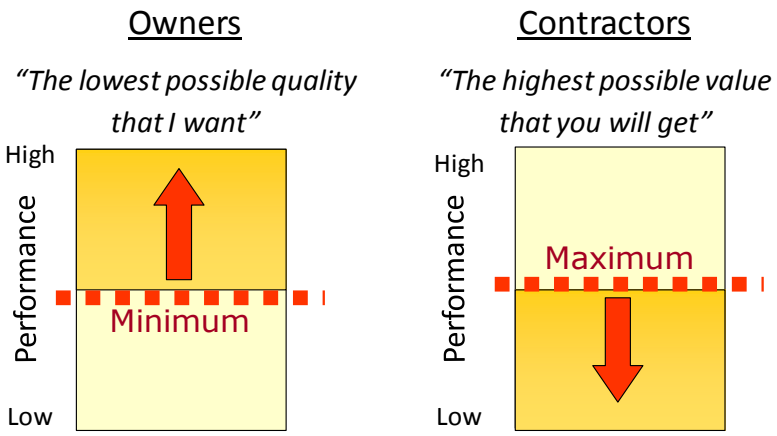

Figure 18.2: Min/Max Dilemma

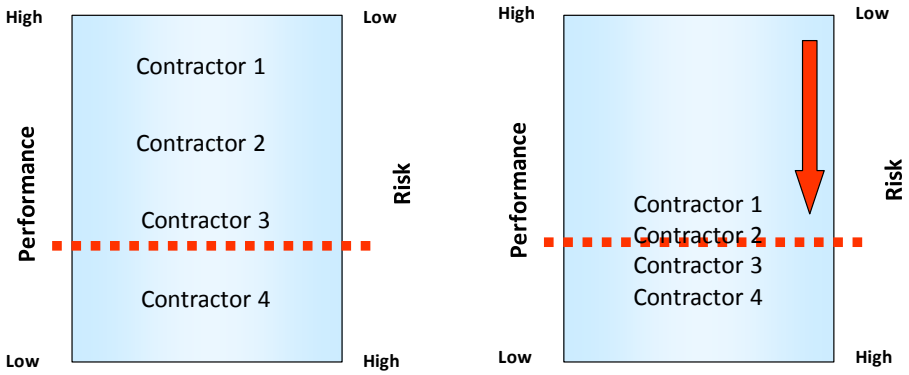

Figure 18.3: Price-Based Award

In the best value environment, risk is minimized through transparency by the best value, which is usually the high performance vendor (designer and contractor). In the Best Value or value based environment, designers and contractors must do the following to be awarded work:

1. Compete based on proven past performance and expertise of the company and key individuals in doing very similar work.
2. Key personnel must be interviewed to identify if they can be proactive and accountable, minimize the risk that they do not control, pre-plan, and to identify if they have the expertise to manage the project.
3. Quantify the d the risk that they do not control (not in the scope of the project) and have a plan to manage and minimize the risk.
4. Key personnel must be interviewed to identify if they have a plan on how they will deliver the requirement which includes a solution, if they can utilize expertise and that they are effective and efficient project managers.
5. Price is determined by the professional/vendor, and it must be competitive. The most expert professional will usually be the low price proposer. The client is hiring an expert with a plan, and will financially cover all risk. The expert professional is responsible for technical mistakes, but not for risk that they do not control.

The difference between the two environments is that the price-based environment has the following negative and unstable characteristics (Kashiwagi, 2014):

1. Non-transparency.
2. Attempt to transfer risk and accountability, both of which are non-transferable.
3. Non-expert in design/construction managing and directing the expert.
4. Increased confusion, and higher flow of communication and documentation.
5. Requires more individuals to make more decisions.
6. Allows less qualified personnel to do the work due to the lack of transparency and accountability.
7. Participants become more reactive.
8. Requires increased management, direction, and control by the client's representatives who knows less.

The price based environment is setup and controlled by the owner/client. Deductive logic shows that the solution might be in changing the system from a price based system to a best value environment. The participant who can implement system change most efficiently is the owner/client because they have the control of the current delivery system (Beemer, et al. (n.d.)).

BV PIPS (Performance Information Procurement System)

An example of an efficient BV system is PIPS (Performance Information Procurement System). "PIPS is an information based procurement system that uses Best Value selection and a performance contracting approach. It minimizes the liability and risk of the designer and owner, maximizes the profit of the contractor, uses partnering as a perception but not a function, and allows the expert vendor to minimize risk through a plan and transparency. PIPS has a methodology to find the best available value and motivates the vendor to assign the best experts to the project. PIPS uses dominant performance information and a transparent environment to select the Best Value contractor, and then uses the rating on the Best Value project to alter the contractor's future competitiveness and performance (Kashiwagi, 2002)." PIPS is a project management (PM) model, a risk management (RM) model, a selection process, a procurement delivery process and a Best Value structure. PIPS uses all of the Best Value practices. PIPS can be run with DBB, DB, CM@Risk, CM, IDIQ, JOC, Performance Contracting, and Best Value contracting. PIPS is a Best Value model that aligns expertise and resources; minimizes transactions; minimizes transaction time and cost; minimizes information flow, decision making, and risk. If decisions are made, the expert makes the decision, as they have the most information and can minimize risk. PIPS can be run in either the price based environment or the Best Value environment; however, it is more effective in the Best Value environment. It can be used for the delivery of any service in any industry. Information on PIPS is available at www.pbsrg.com. ASU researchers initially developed the PIPS for construction contractor selection. It is now being used to select vendors in all industries. The system has been tested on over $800M of construction projects with a variety of owners and $1.5B of services outside of the construction industry. "ASU reports 98 percent on-time delivery, no change orders and an 80 percent reduction in management functions" (Angelo, 2006).

Not everyone agrees that the QBS system results in a price based system. The authors have met many designers who have voiced that the QBS is a quality oriented system which increases the value of the expertise of engineers. A survey was designed and results analysed to identify if the QBS system creates a price based environment.

A/E/C Industry Survey

In October of 2009, an online (internet based) survey was prepared and invitations were sent via email to over 1,200 professionals (architects, engineers and contractors) with 449 responses received (37%). The survey was sent out using the survey hosting website www.survkeymonkey.com. The survey was sent with the objective to identify issues and concepts within the price based marketplace as well as the best value marketplace. The majority of the survey recipients/participants were design professionals from the Arizona marketplace. Responses were received from professionals working for municipalities, engineering consulting firms, architectural consulting firms, contractors, utility providers, etc. The majority of the respondents came from municipalities and consulting firms, representing two distinct sides from within the design-construction market. Municipalities represent the public owner/client while the consulting firms represent the supply side of the industry. There are over 40,000 Licensed Professional Engineers, 28,000 Licensed Professional Architects, and 50,000 licensed contractors in the state of Arizona (Arizona Board of Technical Registration, 2009; Arizona Registrar of Contractors, 2009). From a statistical standpoint the A/E/C population size is considerably large. This equates to a greater than 95 percent confidence level with a plus or minus of five percent (± 5%) margin of error, using commonly accepted statistical analysis standards.

The survey consisted of some identifying questions to determine such things as the respondents' organization type, title, and whether or not they are a licensed engineer or licensed architect. The next section of the survey then asked the respondents to rate 18 statements on a scale of 1-10 (1 Strongly Disagree, 3 Disagree, 5 Don't Know, 7 Agree, 10 Strongly Agree). The first 12 statements were related to verify the existence of Quadrant I and the last six statements were related to relative understanding of Quadrant II of the Construction Industry Structure (Figure 1). The survey respondent's organization type had a nearly even split between the public and supply side of the marketplace. Private consulting services comprised 45% of the survey respondents (Engineering 28% and Architectural 17%). The public owners/clients response made up 41% of the survey. The remaining 14% of the survey respondents included contractors, developers, private utility owners and others. The results of the survey were analyzed in three distinct groups. The first group was the "All A/E/C Respondents" group, consisting of all the respondents. The second group was the "Private Consulting A/E" group or the vendor groups. The third group was the "Public Owner/Client" group or the clients who hire the vendor professionals.

AEC Survey Results

The results of the survey lean heavily towards agreement with identified issues within the price based environment and with the importance of utilizing concepts of the best value environment. The overall survey results are shown in Table 1. The most frequent rating throughout the entire

survey was seven (7). It was chosen 1,457 times. The next highest was eight (8) at 1,317 times. This was followed by nine (9) and ten (10) at 1,017 and 1,011 respectively. After this, five (5) was the next most selected at 825 times. Sixty percent of the time "Agree" (7-10) was chosen, 26 percent of the time "Don't Know" (4-6) was chosen and only 14% of the time "Disagree" (1-3) was chosen. The results of the survey show that the majority of designers either agree with the previous discussion or don't know, with only 14% disagreeing. Rephrasing the results, if AEC participants understood the current AEC environment, the majority agreed with the concepts of IMT, KSM, industry structure and the need to change from the price based environment to the best value environment. Only 14% disagreed. Twenty-six percent didn't know, showing the complexity of the non-transparent environment.

Table 1

Summarized Survey Results of All Respondents

Survey Statements	Disagree	Don't Know	Agree
1. Relationships are important to get work in QBS	8.2%	14.5%	77.3%
2. QBS system results in relationships being very important	10.5%	24.4%	65.0%
3. Design firms hired on relationships and not performance	27.7%	31.1%	41.2%
4. Major objective of A/E/Cs at a conference is to network with owners/agencies and form relationships	5.6%	18.7%	75.7%
5. Differentiation between qualified firms is difficult in QBS	26.3%	30.6%	43.1%
6. A/Es spend more money on marketing than on training, analyzing and improving their own performance	21.1%	45.6%	33.3%
7. Construction and design services are often perceived as commodities by owners	10.6%	36.0%	53.5%
8. A/Es often taken out of core expertise of adding value by design and are instead spending more and more time directing, managing and inspecting contractors	23.8%	44.8%	31.4%
9. Designers should be the experts at design and contractors should be the experts at construction	18.3%	19.0%	62.7%
10. Design services are inefficient but would be more efficient if designers were given total control of the project and held accountable	35.1%	39.1%	25.8%
11. Errors in design documents are motivation for contractor requested change orders	8.3%	20.6%	71.1%
12. Minimum requirements by owners/clients are often viewed as maximums by A/E/Cs in order to remain competitive on price, and results in a lowering of quality	14.8%	32.9%	52.3%
13. Measuring performance of design firms and key individuals would increase accountability and performance	4.9%	15.2%	79.9%
14. Designers should manage risk and deviation on project	9.0%	27.9%	63.1%
15. On design related issues, owners should rely on the expertise of the design professional to identify best course of action	7.2%	21.7%	71.1%
16. Designers should seek assistance of experienced contractors to provide accurate cost estimates and scope	2.7%	10.0%	87.3%
17. Project owners control the level of performance and quality in the A/E/C	17.5%	29.4%	53.1%

industry since they are the ones procuring/selecting the designers			
18. Qualifications, competitive price, minimization of risk, added value, and past performance of the firm and its individuals are all important factors an owner should consider when selecting/procuring a design firm	5.8%	5.4%	88.8%

Question 5, "Differentiation between qualified firms can be difficult using QBS", only had an average rating of 5.71 throughout the industry. However, 43% of the responses fall in the "Agree" group, 31% in the "Don't Know" group, and 26% in the "Disagree" group. The results of this section support the notion that it is difficult to clearly differentiate one qualified firm from another in the QBS process. This result leads to identifying AEC services as a commodity and being more price based oriented. This may also explain why AEC services normally are given a percentage of construction costs, which may not have any relationship to the effort required to support the design and management of construction.

The overall response to Question 7 "Construction and design services are often perceived as commodities by owners" was interesting. The average rating was 6.51, which is right in between "Don't Know" and "Agree". Looking at the responses even further yields some more interesting information. Sixty five percent of the private A&E side agree with Question 7 by giving it an average rating of 7.11. However, only 40% of the public owners/clients agree and 44% don't know, giving them an average rating of 5.8. Much like Question 3, the difference on commodity perception between private and public supports the theory that the existing QBS, price based, commodity based environment is an inefficient and confusing market where the supplier and client disagree.

Eighty percent of the industry agrees with Question 13 "Measuring the performance of the design firm and their key individuals on a project would increase their accountability and performance". This would describe a more transparent environment. The average rating was 7.43. The majority of the industry agrees with Question 14 "Designers should manage risk and deviation on the project". Sixty three percent of all responses fell within the "Agree" range, 28% within "Don't Know" and only 9 percent within the "Disagree" range.

Seventy one percent of the industry "Agree" with the concepts of Question 15 "On design related issues, project owners should rely on the expertise of the design professional to identify the best course of action." The average rating was 7.2, and only seven percent disagree. Designers also agreed that designers cannot scope and cost projects, and require the assistance of high performance contractors. Question 16, "Designers should seek the assistance of experienced contractors to provide accurate cost estimates and scope of projects", received the second highest rating of all the questions with an 8.04 and 87% of the industry agreed with the Best Value concept.

Vendor designers agreed that owners still control the level of performance and quality of design and construction with an average rating of 6.23 and of respondents 53% rating it within the "Agree" range. These results seem to provide more support to the fact that the current design-construction industry is working in Quadrant I (price based environment). However, designers all agreed in Question 18 "Qualifications, competitive price, minimization of risk, added value, and past performance of the firm and its individuals are all important factors an owner should

consider when selecting/procuring a design firm", was the highest rated question in the entire survey. These characteristics are attributes of an efficient Best Value delivery system. Eighty nine percent of the industry agrees with its concepts. The average rating was 8.4, and only six percent disagree.

There were only a few observable disagreements on some of the issues between the client and AEC vendor population samples. Upon analyzing the data it was determined that the major disagreement that existed between the public (client) and private sectors (vendor design firms) was in regards to the Qualification Based System (QBS). This demonstrates the confusion that exists within the existing QBS, and may be one of the major factors contributing to a price based environment. By definition, the disagreement identifies non-transparency. When transparency exists, stakeholders will agree due to the transparency and ease of understanding. The industry (vendor community) agrees that in the QBS (Qualification Based Selection) process, relationships with public owners/clients are very important in order to obtain work. This is a major characteristic of the price based marketplace, where the environment is not transparent.

The survey results showed that both the clients and the vendors were in agreement with Questions 1 "Relationships are important for design firms to get work from project owners in the existing QBS process" and Question 2 "The QBS system results in relationships being very important" regarding the QBS process, with seventy seven percent of the industry agreeing with Question 1 and sixty five percent of the industry agreeing with Question 2. The results of Questions 1 and 2 have an average rating of 7.60 and 7.01 respectively.

The disagreement between the client and vendor population came in regards to Question 3 "Design firms are often hired based on relationships instead of capability and performance." The average rating for question three was identified to be in the "Don't Know" range (5.58.) The disagreement between the clients and design firms can be easily seen in the histograms of Figure 18.4. Clients felt that relationships did not matter in regards to the hiring of vendors, but the design firms responses were in direct conflict. Fifty seven percent of the private A&E respondents agree with Question 3, 29% don't know and 14% disagree. To the contrary, 45% of the public owners/clients disagree with Question 3, 32% don't know and only 23% agree.

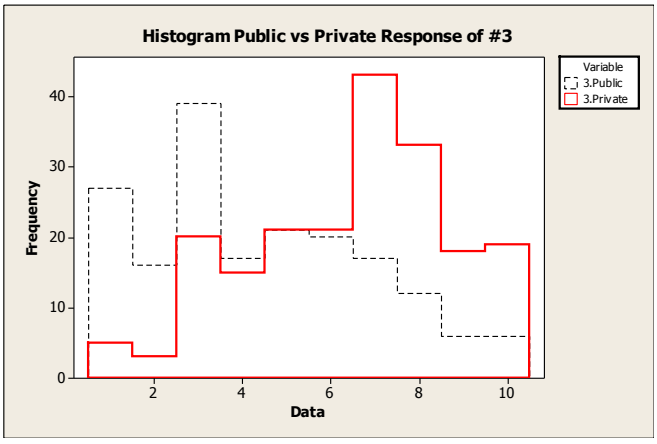

Figure 18.4: Disagreement between Clients and Vendor Designers

To verify that there was a significant difference between the public and private ratings (for Question 3) a T-test was performed, which verified that the observation was accurate, showing that the probability of making the wrong assumption was 1.52x10-15 percent. This level of error is far under the acceptable 5% at 0.01 percent (0.01%). Seventy six percent of the industry agrees with Question 4 "The major objective of contractors and design consultants at a conference is to network with owners/agencies and form relationships". The average rating was 7.35. The results are further demonstration of the importance of relationships in the existing QBS, price based, and commodity-based market.

Conclusions and Recommendations

The current AEC industry is a non-transparent, relationship based environment. The survey of designers representing both the clients/owners and the design firms validates these concepts. The current Qualification Based System (QBS) AEC selection process, is a centrepiece of this non-transparent environment. Because relationships are such an important part of the environment, the client will use management, direction and control of the AEC vendors. When MDC is utilized, AEC expertise will not be utilized. IMT, KSM, CIS and BV research has identified that when an environment is non-transparent, the value of the AEC expertise will be minimized, which leads to the commodity or price based environment. The hypothesis of moving to a best value approach where control of projects is shifted to the AEC expert vendors is validated by this study.

The AEC industry perceives that the environment is a price based marketplace. The owners/buyers of the service do not have the same understanding. The disagreement shows the confusion in the AEC industry. Survey results suggest that the A/E/C industry is strongly in favour of moving design professionals into a best value environment. The authors also suggest that the Performance Information Procurement System (PIPS) can be used as a mechanism to move the design environment.

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Best Value Case Study for Cold Storage Facility in Miami, Florida

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A cold storage facility had been reroofed in 2003 (investment of $600,000) that required the removal of existing insulated roof and replaced with a 20 year modified bitumen roof. After six years, the facility posed a safety hazard due to the ice formations inside the cold storage facility. The source of the problem was not known. The traditional process of using a professional designer, a certified contractor, receiving a manufacturer's warranty, and having the roof inspected by the local government inspector could not assist the owner and the FM resolve the complex problem. The facility manager (FM) decided to utilize a non-traditional Best Value (BV) Performance Information Procurement System (PIPS) to identify and resolve the problem. The main difference of the system is that the best value vendor and not the owner determines the final scope. This paper documents the BV PIPS approach and the resulting performance. An inspection five years later verified the performance of the Best Value approach and showed the value of the installed sprayed polyurethane (SPF) roofing system.

Keywords: best value, roofing, energy savings, performance

Introduction

In the fall of 2009, the project/facility manager for the cold storage facility at 555 N.E. 185th Street, Suite 107, Miami, FL 33179 Fort Lauderdale, Florida, contacted the Performance Based Studies Research Group (PBSRG) to assist with a very difficult facility management (FM) issue. The cold storage facility had to maintain an inside temperature below -10 degrees Fahrenheit. In the summer time, Miami has temperatures over 100 degrees and average humidity of 73%.
The cold storage facility had been reroofed [investment of $600,000] six years earlier [2003] with the requirement of removing the existing insulated roof, and installing a new 20 year modified bitumen, insulated roofing system. The expectation of the facility manager and the tenant was a trouble free cold storage facility for the next 20 years.

After six years, without noticeable deterioration on the exterior roofing system, the cold storage facility was experiencing widespread and dangerous ice formations [as large as five feet in length]. The ice formations caused a safety hazard as well as a potential inefficient electrical usage. The cause of the problem was not immediately known, however, the facility manager representing the building owner along with the tenant proposed that a new roof may be required.

The owner had just spent $600K six years earlier with the expectation of a minimum 20 year roof performance, and now was facing another minimum $600K investment [probably more]. The owner also had intentions of selling the property which could only be done if the cold

storage problem was rectified. The FM was facing a hitch that is a property manager/FM's worst nightmare. It was an unanticipated problem that requires a huge financial investment, after the owner had previously invested to solve the same problem [roofing/waterproofing problems makeup 80% of all building/facility problems.] Regardless of who is at fault, the facility manager was now working with a more hostile owner.

The tenant moved into the facility at 555 N.E. 185th Street, Suite 107, Miami, FL 33179 Fort Lauderdale in July 2008. The tenant runs a storage and delivery of frozen foods to the cruise ship business operating out of Miami. They moved into the facility in 2008 with the understanding that the facility was in good working order. The ice formations in the cold storage caused a safety issue, a cost issue for the client [the tenant was paying the electric bill] and a customer dissatisfaction issue.

The FM was facing a problem that was not well understood and which had gotten past a professional designer, the county inspecting office, a certified roofing contractor, a manufacturer of roofing systems and their own FM/engineering group. The owner wanted the problem solved and was contemplating suing the previous roofing contractor who installed the previous roof. The engineering firm that wrote the roofing specification and accepted the completed roof would also be involved in any roofing non-performance issue. The county inspector would also be complicit if the roof was not properly installed. The FM had to identify the problem, have an explanation of why the problem occurred, identify who was responsible for the problem and have the nonperforming parties solve the problem and have a simple and clear explanation to the owner that would convince them to pay to fix the problem the second time [which was not solved by the appropriate parties the first time]. The owner's FM no longer had confidence in the traditional professional engineering service or the roofing contractors.

The FM was introduced by a best value expert, Denise DiGruccio, to the Best Value approach to solving facility problems. The process was called the Best Value [BV] Performance Information Procurement System [PIPS]. The last couple of decades have revealed a poor documentation of performance information in the construction industry (Cahill and Puybarand, 1994; CFMA, 2006; Flores and Chase, 2005; Egan, 1998, Davis et. al. 2009) Many researchers have suggested different types of systems in attempt to change this trend (Hillson, 1997; CII, 1995; Gibson et. al., 2006; Hamilton, 1996; Sullivan, 2010; Davis, et. al., 2009; Sweet, 2011). The BV PIPS is different from the traditional delivery systems because it utilizes expertise of industry experts and minimizes the management, direction and control [MDC] of the vendors. An expert can think in the best interest of others, identify the risks involved in the project and can pre-plan. Instead of specifying what the expert vendor must do, it identifies what the owner "thinks" is the problem and the general intent of the owner [to solve the perceived problem]. Because the owner is not an expert, they will utilize the expertise of the expert vendors to solve the problem. The owner is not liable to definitively know either the problem or the solution as they are the non-experts. It then allows the expert vendors to compete based on their ability to identify and solve the problem with their accompanying prices [what, why, how, and what it will cost]. The prioritized best value expert vendor based on expertise and cost then clarifies in detail what they will do to meet the expectations of the client.

In the BV PIPS approach, the expert vendor is not identified solely by profession, education, trade or length of experience, but by their capability to identify and fix the client's problem. The expert is the vendor who can and will fix the problem. They are the entity who can do it for the least cost and the give the owner the highest value. It is well documented that the product specifications using minimum standards, have no direct correlation with the performance of an installed system (Kashiwagi, 1996).

Problem

The facility was reroofed in 2003 to eliminate problems with leaking and ice formation. The specifications were done by an engineering service representing the client. After six years [2009], ice continued to form in the cold storage facility as shown in Figure 1, and the facility management representative perceived that the problem had to be rectified even though it was a recently installed roofing system [six years previous].

Figure 1: Ice Formations

The FM group representing the owner faced the following problems:

1. They had previously hired an engineering firm to analyze and solve the problem with ice forming in the cold storage facility before roof was installed in 2003. The owner would be very hesitant to hire the same or another engineering firm.
2. They hired a roofing contractor who reroofed the facility installing roof according to instructions of the engineering firm's specifications. The roofing contractor claimed they met the requirements of the specification and was not liable for any damages.
3. The roofing manufacturer gave no assistance even though a warranty was issued.
4. The installation of the new roof in 2003 was inspected and approved by the Dade County inspectors.
5. The roof system installed in 2003 did not perform as ice had formed in the cold storage facility.

The legal and professional protection of the delivery of the roofing system [professional engineering firm, the government inspection group, the manufacturer's warranty, the certified

roofing contractor, and the engineering specifications] had failed to protect the owner. The FM was now requesting the owner to pay an additional $600K+ to pay for a new roof of which the problem [source of the ice formations in the cold storage facility] with the existing roof system was not clearly identified.

Solution

The FM made a decision to utilize the Best Value (BV) Performance Information Procurement System (PIPS) which utilized the expertise of the expert roofing vendors to minimize risk. The owner identified what they perceived the problem was [ice formation within the cold storage facility] and used the BV PIPS to have expert vendors more accurately identify the problem and solutions. The FM then used the BV PIPS structure to identify the most capable and expert vendor. The best value vendor's solution would then define the final project scope.

This is a case study test of the FM using the non-traditional BV PIPS system to solve their facility problem. Instead of having the owner hiring an engineering firm to identify the problem and solution and then manage, direct and control [MDC] the lowest priced vendor, the client used the BV PIPS system to identify the expert vendor and utilized the expert vendor's solution to solve the problem. This is counter to the traditional system where the owner utilizes their own professional engineering firm to identify the problem and then use MDC in the form of engineering specifications and standards to MDC the lowest priced vendor to do the work.

Methodology

This paper will discuss the conceptual differences of the BV PIPS delivery system. It will then go through the steps of the BV PIPS steps that facility manger (FM) used to identify the BV vendor and its results. Five years later, the performance was again determined based on roofing performance and cost saving based on actual energy savings. This Post Occupancy Evaluation (POE) method where a finished product is evaluated to measure the quality is currently being implemented in the industry to measure quality (Wicks and Roethlein, 2009). Visual inspections and condition assessments procedures are also used in the industry to determine performance (Bailey & Bradford, 2005; Coffelt et. al., 2010).

In the previous installation of roofing system, the owner hired a professional engineer who decided what the problem was, what had to be done, and how to do it [MDC], and ensured that the expert roofing contractor followed their instructions. The installation was also inspected by the county inspector. After six years, the FM, the facility owner and the tenant could clearly observe that "something was wrong" with the formation of five foot ice stalagmites in the cold storage facility. No party [engineering firm, certified roofing contractor, roofing manufacturer or government inspector] volunteered to be legally or professionally accountable for the nonperformance. The owner would have to have an expert identify what was wrong and then attempt to get a mediated settlement. In this traditional system, it is very difficult to assign accountability (Sullivan and Michael, 2011). Multiple models and strategies have been proposed to increase accountability in different areas of construction (Sohail and Cavill, 2008; Cavill and Sohail, 2005; Chen, 2013)

This paper is a natural comparison of results of the traditional delivery of service and the innovative BV PIPS delivery system. The previous roofing system was delivered using the traditional management, direction and control [MDC] methodology. It resulted in poor performance and limited accountability and responsibility between the party who designed the solution, the party who installed the solution, and the party who inspected and ensured the system was installed correctly.

In the new BV PIPS system, vendors compete to identify the highest level of expertise, and the expert vendor identifies what to do and how to do it. The owner's management, direction and control [MDC] is replaced by the utilization of the expert's expertise. In simple terms, if someone is an expert, no other entity should need to direct them on what to do. Due to the single source of expertise, the vendor is responsible for solving the problem. The single source of responsibility minimizes decision making and creates transparency.

Best Value Performance Information Procurement System [PIPS]

The BV PIPS system was discovered by Dean Kashiwagi in 1991, and is currently being tested and developed by Performance Based Studies Research Group [PBSRG] at Arizona State University. BV PIPS is a licensed system by AZ TECH, the licensing arm of Arizona State University. The BV PIPS system has the following conceptual differences from the traditional systems (Kashiwagi, 2014):

1. Utilizes expertise to lower cost and add value.
2. Identifies expertise as the only factor that can minimize risk of nonperformance.
3. Identifies warranties, specifications and standards as inefficient in minimizing risk.
4. Identifies that attempting to manage, direct and control non-expert vendors is inefficient and costly.
5. Identifies if you ask a vendor to describe the problem, how they know that it is the problem, how they know they can solve the problem using performance metrics and by recognizing natural laws the differentiate experts from non-experts, the risk of nonperformance is minimized drastically.
6. Methodology that a non-expert can identify an expert vendor and utilize the expertise to lower cost and risk.

The BV PIPS can be implemented in different variations. It includes a competitive selection phase, a clarification phase and an implementation or execution phase. The contract is signed after the clarification phase. The competitive selection phase is where value is identified by the comparison of values and prices. The best value is always the "best value provided for the lowest price" and is relative. The best value is always the best value of a group of proposed vendors. Once the best value is identified in the competitive selection phase, the best value vendor must identify in detail what they are going to do in the clarification phase. This detailed proposal [clarification] is then put into the contract along with the vendor's price. The contract is signed and the contractor delivers their solution in the execution phase.
The characteristics of the BV PIPS include:

1. The owner identifies a problem [ice formation inside the cold storage facility]. There is no clear identification of how the water or vapor penetration into the cold storage. Regardless of the owner's lack of knowledge of the problem and the solution, the expert vendor is required to solve the problem of the ice formations.
2. The competing contractors respond to the problem by providing proof of their expertise and a price. The proof of expertise can be determined in many different ways. It normally includes past performance metrics on similar projects. The FM utilized performance metrics of Neogard's Alpha Program. The Alpha program is a program sponsored by Neogard, a manufacturer of high performance urethane coating systems [often utilized with a layer of sprayed polyurethane foam [SPF]. The Alpha program utilizes performance metrics which show the relative performance of high performance contractors (Kashiwagi et. al. 2010). A short explanation will be given later.
3. The contractors were asked to propose their solutions.
4. The owner utilized an interview as a very key component of the competition. The owner defined an expert by several characteristics of the Alpha program that will be discussed later.
5. The BV PIPS system then identified the expert based on the performance metrics and the prices.
6. The owner then utilized a "clarification period" where the best value vendor clarified [clearly identified their solution] in detail. The solution then shaped the contract.
7. The best value vendor then installed their solution and the owner rated their installation.
8. There were several change orders in the contract due to additional information once the pre-existent conditions were identified by the best value vendor.
9. The performance of the contractor during their roof installation is rated by the owner.
10. Over time, the solution can be analyzed for performance [not leaking, no ice formation and low energy bills due to the stopping of ice formation in the cold storage facility.] This performance may override any perceptions that they have during the roofing installation.

In the process, the client was instructed to minimize their decision making. Decision making increases risk. If all the vendors look alike to the client and no vendor differentiates themselves, the BV vendor is the lowest costing vendor. Expert vendors show their high performance on previous similar work through the use of performance information. They will show confidence on the subject project by addressing the needs and concerns of the client. If the BV PIPS overall scores are close, the owner/buyer is encouraged to go with the lower priced option. If the best value vendor is more expensive [by a significant amount], the best value vendor must clearly identify why they are more expensive.

Competitive Selection Phase

Four contractors submitted proposals for the reroofing project. One of the contractors (Vendor B) proposed two different types of systems, a SPF roofing solution (Vendor B1) and a single ply TPO solution (Vendor B2) [inexpensive option]. The criteria for the selection phase were taken from the Best Value PIPS approach and the Neogard Alpha program (Kashiwagi, 2009). This included:

1. Customer satisfaction of previously installed roofs. This included roof sizes, roof ages and roof performance information [leak history].

2. Calculated "sum age" metric [of all roofs that never leaked]. This is the total years of all roofs that never leaked and where the client was satisfied.
3. Proposed cost.
4. Rating of an interview of the vendor's project manager for the subject project.

The client identified cost and interview rating as the highest rated criteria (see Table 1). The vendors would have to score well in the cost criteria [lowest cost] and interview [highest interview score]. The vendors' articulation of the problem and solution and their ability to show the characteristics of an expert vendor on a very controversial and complicated project in the interview, was very important to the selection committee. The cold storage facility problem was unique in that it was in a very humid and hot environment. The source of the problem was not known. The tenant could not afford to shut down or move their operations to another facility during the construction. This made the vendor's temperament, understanding and capability to work around the client's operations very important. The cost was important because the building owner had to be convinced to invest the estimated $600K+ for the project. Unless one of the options was dominantly better, it would be hard to convince the owner to pay more the second time to fix the same problem.

Table 1

Weightage Breakdown

Selection Criteria	Selection Weights
Proposed Duration	10
Proposed Total Cost	43.35
Sum of age of all the jobs that do not leak	6.66
Past Performance	3.33
Average age of all the jobs	3.33
Average roof size	3.33
Interview Rating	30

Table 2 compares the proposal information for 4 contractors that bid on the project. Vendor B was immediately at risk because they submitted only one past project and the average age of jobs on like projects did not show performance and were the lowest when compared to other vendors. Moreover, the interview scores for Vendor B showed a lack of acceptability by the client's rating team [1.1 out of a maximum of 10.0]. By observation of the vendor's price submittal, the vendor's price was the highest price for the encapsulated insulated roof system. To compete with the other vendors, vendor B tried to substitute a lower costing roofing system [lowest costing of all roofing systems]. Vendor B also submitted only one previous roof installation, and the installation had just been installed [no past performance]. The FM also stated that Vendor B had verbally harassed the FM, and tried to harass the owner as well throughout the process. When the FM would not consider this vendor, the vendor went above the level of the FM to attempt to convince the owner that their FM was making a mistake and should award them the project.
By observation of the information, the competition was down to four potential vendors. Vendor A and Vendor E were the only ones that included the addition of wall insulation in their proposal. Other vendors proposed only to insulate the roof. Vendor A and E had the highest interview score. However, Vendor E was over $100K higher in price than Vendor A [18%

higher cost]. Vendor D had the highest past performance of all the vendors. However, Vendor D's price was also high [$60K or 10% higher]. Vendor D was not offering the wall insulation. Neither Vendor E nor C was able to override the huge advantage of price and interview rating score of Vendor A.

Table 2

Proposal Information

Criteria	Vendor A	Vendor B1	Vendor B2	Vendor C	Vendor D	Vendor E
Proposed Duration (days)	85	60	50	30	60	60
Proposed Total Cost ($)	$570,846	$798,960	$577,824	$596,000	$629,574	$685,379
Sum of age of all the jobs that do not leak	19.1	0.5	0.5	84.5	264.0	14.7
Past Performance (out of 10)	10.0	9.9	9.9	9.5	10.0	9.6
Average age of all the jobs (Yrs.)	1.5	0.5	0.5	6.5	14.0	3.7
Average roof size (SF)	60,244	40,669	40,669	12,080	60,595	159,988
# of Surveys	14	1	1	13	19	4
Interview Rating (out of 10)	9.39	1.11	1.11	4.94	4.83	6.28

The interview results of Vendor A made a significant impact on the selection committee. When compared with the other vendors, Vendor A was the clear choice of the selection committee. When calculated the final prioritization the lowest price [which the selection committee did not see until the end] and the interview rating made Vendor A the clear choice.

Table 3

Normalized Data

Criteria	Vendor A	Vendor B1	Vendor B2	Vendor C	Vendor D	Vendor E
Proposed Duration (days)	3.53	5.00	6.00	10.00	5.00	5.00
Proposed Total Cost ($)	43.35	30.97	42.83	41.52	39.31	36.11
Sum of age of all the jobs that do not leak	0.48	0.01	0.01	2.13	6.66	0.37
Past Performance (out of 10)	3.33	3.29	3.29	3.17	3.33	3.21
Average age of all the jobs (Yrs.)	0.35	0.12	0.12	1.55	3.33	0.88
Average roof size (SF)	1.25	0.85	0.85	0.25	1.26	3.33
Interview Rating (out of 10)	30.00	3.55	3.55	15.78	15.43	20.06

Each normalized data [Table 3] for the vendor was multiplied by the weight breakdown for the respective selection criteria to calculate the total points for each vendor. The total point's breakdown for each vendor is shown in Table 4.

Table 4

Total Point Breakdown

Criteria	Vendor A	Vendor B1	Vendor B2	Vendor C	Vendor D	Vendor E
Proposed Duration (days)	3.53	5.00	6.00	10.00	5.00	5.00
Proposed Total Cost ($)	43.35	30.97	42.83	41.52	39.31	36.11
Sum of age of all the jobs that do not leak	0.48	0.01	0.01	2.13	6.66	0.37
Past Performance (out of 10)	3.33	3.29	3.29	3.17	3.33	3.21
Average age of all the jobs (Yrs.)	0.35	0.12	0.12	1.55	3.33	0.88
Average roof size (SF)	1.25	0.85	0.85	0.25	1.26	3.33
Interview Rating (out of 10)	30.00	3.55	3.55	15.78	15.43	20.06
TOTAL POINTS (out of 100)	**82.30**	**43.79**	**56.64**	**74.41**	**74.32**	**68.96**

Table 5 breaks down Vendor A's proposal. As stated before, Vendor A also proposed to encapsulate and insulate the walls of the facility. They assumed that vapor penetration was a source of part of the problem causing the ice buildup in the cold storage. This assumption showed their expertise, and would result in the tremendous performance of their finished installation. The Selection of Vendor A in the best value approach resulted in the lowest price for the best value. Table 5 is a breakdown of Vendor A's proposal.

Table 5

Bid breakdown for Vendor A

Criteria	**Total Cost**
Mobilization	$8,500
Permits & Engineering	$5,000
Polyurethane Foam & Coating Materials	$228,388
Existing Roof Removal	$65,961
New Roof Application	$143,227
New Wall Application	$106,320
Clean up	$5,000
Demobilization	$8,500
TOTAL BASE COST	**$570,846**
Change Order 1	$337,309
Change Order 2	$208,860
Additional Service 1	$67,500
TOTAL AWARDED COST	**$1,184,515**

After awarding the project to Vendor A, destructive testing of the roof revealed the following:

The contractor who installed the existing roof did not do a tear off of the existing insulation as directed. Instead, they installed an insulation board over the existing insulation system, fastening the board with roofing screws. Their installation created more penetrations through the existing steel deck. The existing insulation had to be removed to the deck due to saturation and the formation of ice on the metal roof deck. Change order #1 was to completely remove and dispose all existing roof systems on Section 8 upper roof (22,035 SF) down to the existing metal roof deck and install the polyurethane foam to the existing metal ribbed deck.

When Vendor A removed the existing roofing systems and insulation, they found that the metal deck was riddled with rust almost like "swiss cheese". Their guess had been right and vapor had penetrated into the roofing insulation and created an ice situation on both sides of the freezer ceilings and walls. Change order 2 was to remove and properly dispose off the unsafe steel roof decking from Section 8 upper roof and Section 9.

Vendor A realized that the tenant did not want to shut their operations while the roof was being removed and installed. Their team realized that the cold storage room could be separated by an insulated wall. The insulated wall would create two compartments which could utilize the two existing chiller units, essentially creating two cold storage compartments. The newly installed insulated wall would allow the tenant to not have to transition to another facility while the new roof was being installed. The two compartments would allow the roofing Vendor A to reroof one compartment at a time, while the tenant conducted operations out of the other compartment.

The total cost of the project was $1.2M. The owner entered with the previous roofing contractor and was able to recoup some of the costs of damages caused by the improper application.

However, due to the designer inspecting the roof and the roof passing inspection, it was difficult to fully recover for damages.

One of the main components of BV PIPS is the weekly risk report after signing the contract. The weekly risk report is a communication tool for the owners, contractors and other stakeholders that track cost and schedule deviations. The major sections in the weekly risk report are milestone schedule, risk minimization plan, risk sheet that identifies who caused the risk, the solution to the risk and time and cost deviations. Weekly risk report creates transparency and documents the on-going status of the projects.

Vendor A was not familiar with the weekly risk report and did not utilize it to its full extent. The FM and the owner gave Vendor A lower performance ratings due to the misunderstanding that the project did not come in on time and there was not a weekly risk report that kept them abreast of the unforeseen risks on the project. However, after analyzing that all of the risks were due to the client and not the contractor in Table 6, it can be seen that Vendor A performed to the highest levels. The FM has now scored the best value contractor with a10 out of 10 rating due to no schedule and cost impacts by the contractor.

Table 6

Project Risks

Source of Risk	Total # of Risks	Schedule Impact (Days)	Cost Impact ($)
CONTRACTOR IMPACT - General Issues	0	0	$0
DEALER IMPACT - Sub/Supplier Issues	0	0	$0
DEALER IMPACT - Oversight of Design	0	0	$0
ARCHITECT / DESIGNER IMPACT	1	0	$24,485
CLIENT IMPACT - Scope Change / Decision	2	63	$0
CLIENT IMPACT - Contractors (GC, Mech., etc.)	2	75	$0
CLIENT IMPACT - Contract / Payment	1	30	$0
CLIENT IMPACT – Other	0	0	$0
Impact of unforeseen conditions	5	188	$610,000

The cost deviation of $24,485 was due to the structural problems. In the tear off of the roof, the vendor noticed that connection from the wall clip to the beam is not attached in multiple locations. A third-party vendor had to be hired to rectify this issue. The client was the source of risk due to extended time required by the owner's procurement person taking an extended period of time to write the contract. The late issuance of NTP and mechanical and electrical upgrades also took extended time. The unforeseen risks associated with the project include the metal deck deterioration, disposing of unsafe steel roof decking, safety issues due to aged ammonia lines, and weather delays. Vendor A was not a source of any change orders (time and cost deviations) during the project. The proposed schedule by Vendor A is shown in Table 7.

Table 7

Project Schedule

No	Critical Activities / Milestones	Proposed Schedule
1	Turn on project	06/01/09
2	Permitting and Engineering	06/22/09
3	Mobilization	06/25/09
4	Temporary wall construction	07/03/09
5	Existing roof removal operations	07/23/09
6	Polyurethane foam application on roof	07/23/09
7	Butyl rubber coating application on roof	07/28/09
8	Polyurethane coating application on roof	07/29/09
9	Clean and prepare existing wall panels	08/02/09
10	Polyurethane foam application on walls	08/09/09
11	Butyl rubber application on walls	08/15/09
12	Fire barrier application on walls	08/19/09
13	Acrylic coating application on walls	08/23/09
14	Clean up	08/30/09
15	Demobilization	08/31/09

Results

One of the biggest advantages of a sprayed in place foam [SPF] system is its energy savings due to seamless encapsulation of the building. The SPF system is known in the construction industry as a thermal insulation (Kashiwagi & Tisthammer, 2002). It also acts as an air sealant by encapsulating and closing the gaps that allow the movement of air. The coating that is applied over the foam can perform at freezing temperatures (Kashiwagi & Pandey, 1997). The Florida environment also has high humidity, thus moving moisture with the air movement. This combination of air and moisture movement increases the use of energy in the Kansas Marine cold storage facilities. Table 8 shows the difference in temperature and vapor pressure through the proposed six inches of SPF. There are three major analyses: When the outside temperature is 80 degrees F, with outside temperature of 100 degrees F, and without a butalyne moisture barrier. The inside temperature is -10 degrees F.

Table 8

Vapor Drive Analysis

		Exterior Temp 80 degrees F			**Exterior Temp 100 degrees F**			**No butalyne moisture barrier**		
No	TVR*	VPA*	SVP*	Saturation	VPA*	SVP*	Saturation	VPA*	SVP*	Saturation
1	Exterior Air Space	1.030	1.030	0.000	1.03	1.93	-0.90	1.03	1.03	0.00
2	Urethane Coating	0.992	1.030	-0.038	0.99	1.93	-0.94	0.91	1.03	-0.12
3	Butylthane Coating	0.303	1.030	-0.727	0.30	1.93	-1.63	0.91	1.03	-0.12
4	Polyurethane Foam (1 inch)	0.270	0.623	-0.352	0.27	1.10	-0.83	0.81	0.62	0.18
5	Polyurethane Foam (1 inch)	0.237	0.376	-0.139	0.24	0.60	-0.36	0.70	0.38	0.33
6	Polyurethane Foam (1 inch)	0.204	0.212	-0.008	0.20	0.31	-0.11	0.60	0.21	0.39
7	Polyurethane Foam (1 inch)	0.171	0.113	0.058	0.17	0.16	0.01	0.49	0.11	0.38
8	Polyurethane Foam (1 inch)	0.138	0.054	0.084	0.14	0.07	0.07	0.39	0.05	0.33
9	Polyurethane Foam (1 inch)	0.105	0.025	0.080	0.10	0.03	0.08	0.28	0.03	0.26
10	Metal Deck	0.022	0.025	-0.003	0.02	0.03	0.00	0.02	0.03	0.00
11	Inside air film	0.022	0.022	0.000	0.02	0.02	0.00	0.02	0.02	0.00

Note: VPA – Vapor Pressure Absolute, SVP – Saturation Vapor Pressure, TVR – Thermal and Vapor Resistance

Where the vapor pressure is greater than the saturation pressure, water will condense in the newly installed roofing insulation system. It can be clearly seen that a moisture barrier will be required which is included in the installed urethane coated SPF system. To meet code, the combined urethane [45 mils] /butalyne [mils] system had to be fire tested to meet either the ASTM E-108 or the FM Class 1 flame spread test requirements of a maximum of six feet in 10 minutes.

The proposed granulated urethane/butalyne coated six inches of SPF was a modification from the manufacturer Alpha system and was warranted for 15 years. The modification allowed the minimization of moisture in the SPF insulation. Although this is a theoretical calculation, the assumptions are simple moisture transfer equations.

In 2014, the author revisited the facility site to verify the roofing waterproofing performance. The roof was in great condition with no observable defects, no ice formations from vapor drive through the roofing system. The author inquired whether the tenant had any energy cost data and upon learning that the information was readily available the energy cost saving analysis was performed. The raw energy usage for the tenant from July 2008 to June 2014 is in the Appendix 1. The monthly energy cost before and after the roof was insulated is shown in Table 9. The

overall standard deviation for the energy cost is $2,177 and the overall standard deviation for the energy usage in kilowatts is 19,607.

Table 9

Monthly Energy Cost

Criteria	Cost
Average Monthly Energy Cost before the roof was insulated	$22,898
Average Monthly Energy Cost after the roof was insulated	$18,930

AVERAGE MONTHLY ENERGY SAVINGS AFTER ROOF INSULATION ($)	**$3,956**
AVERAGE MONTHLY ENERGY SAVINGS AFTER ROOF INSULATION (%)	**17%**

The roof was insulated in late October 2009. Table 9 shows the energy cost and usage from 2008 to the present. Figure 2 shows that the average monthly bill has decreased since the insulation. Figures are missing from two months. Alumbaugh & Humm (1984) also found significant energy savings by the application of foam insulation in their studying of the long-term weathering performance and the energy savings. However, the study on energy savings for sprayed polyurethane foam insulation has not been determined in the industry.

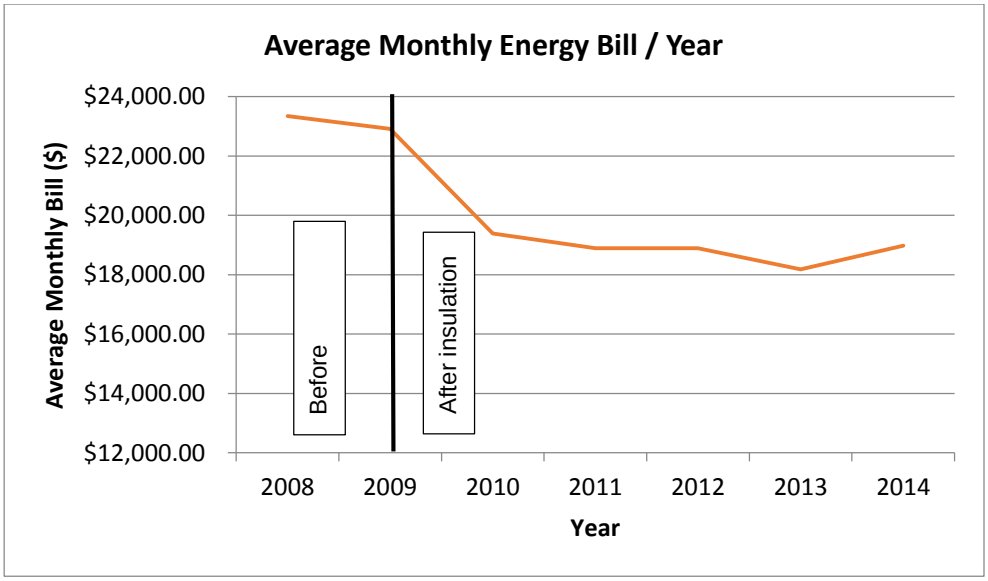

Figure 2: Average Monthly Energy Cost / Year

The researchers analyzed the months for energy costs and usage for deviation and came to the following conclusions:

1. There is no significant deviation in usage or price of energy by month or by year.
2. The average savings in cost per month is 17%.
3. The return on investment is 14 years.
4. The roof is warranted for 15 years. It has been in service for five years and there is no sign of major deterioration.
5. If the roof lasts for the warranted 15 years the energy savings has paid for the roof. The owner has received the roof for free due to the payback in energy savings. The value added is $650K over 15 years.

The FM utilized the BV PIPS system to add tremendous value to the owner of the facility. The roof performed, returned the roof value back in 14 years, and has a potential life of over 20 years (Kashiwagi & Tisthammer 2002)]. The FM utilized the expertise of expert vendors, with no technical knowledge of the facility.

Conclusion

In 2009, the facility manager tested the Best Value (BV) Performance Information Procurement System (PIPS) to deliver a solution to a very troublesome cold storage facility. Five vendors responded to the solicitation. The BV PIPS matrix was heavily weighted on price and interview to ensure that the vendor had expertise to minimize risk and cost and that the solution would be acceptable to the owner who had previously paid for the reroofing and was now being asked to pay an additional $650K to fix the problem.

Based on the study, the following was concluded:

1. The FM did not have confidence in running the traditional design, bid, award process due to the failure of the traditional system to ensure roof performance six years earlier despite utilizing a professional engineer, certified contractor, in possession of a manufacturer's warranty.
2. The FM ran the BV PIPS process without knowing the source of the problem, without any technical experience and without the assistance of a professional technical designer.
3. The BV Vendor A had the lowest price, the most creative and acceptable solution, and used their expertise to identify the source of the ice formation inside of the cold storage units.
4. One of the competitors attempted to use their status of being a large nationwide contractor rather than proving their capability. The contractor was non-competitive and the FM identified that the vendor did not understand the concept of proving their performance and expertise.
5. The BV contractor waterproofed the cold storage facility, fixed structural issues, completely replaced the roofing and wall attachments of the cold storage facility, and installed an encapsulating roofing/waterproofing system.
6. Installed a 15 year warranted urethane coated sprayed polyurethane roof system that saved the tenant $19K/month or 17% of their energy consumption [payoff duration of 14 years].
7. The Cold Storage facility is working well with no return of ice stalagmites in the freezers after five years.

The BV test impressed the owner, the code compliance group, the facility manager and the tenant. The tenant management has been extremely pleased with the performance of the sprayed polyurethane and urethane waterproofing coatings on the wall and roofing system which has minimized the penetration of moisture and ice formation in a temperature differential of up to 130 degrees for over five years. Figure 3 shows the pictures of the wall insulation and the roof insulation after the project completion.

Figure 3: Completed Project

After being introduced to sprayed urethane coated SPF roof system, the city inspector created the county SPF specification. After seeing the results of this project, he proposed that the SPF encapsulation of a cold storage facility could be successful in any location based on its performance in Fort Lauderdale Florida extreme hot and humid environment.

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Appendix 1 – Energy Usage for Kansas Marine

	2008		2009		2010		2011	
Month	**Cost**	**Kwatts (x 10^3)**	**Cost**	**Kwatts (x 10^3)**	**Cost**	**Kwatts (x 10^3)**	**Cost**	**Kwatts (x 10^3)**
1			$25,807	292	$21,281	301	$20,197	283
2			$22,900	261	$21,005	297	$18,316	249
3			$23,319	269	$19,896	280	$19,233	263
4			$23,246	258	$19,979	282	$19,083	258
5			$23,049	252	$19,417	271	$18,239	246
6			$21,673	249	n/a	n/a	$19,512	268
7	$24,058	292	$23,361	274	$17,238	238	$19,357	263
8	$21,966	241	$22,865	251	$19,754	269	$16,661	223
9	$24,015	267	$19,923	211	$20,433	284	$19,173	268
10	$23,460	259	$22,835	262	$18,339	249	$18,261	244
11	$24,089	267	n/a	n/a	$17,778	242	$18,722	254
12	$22,449	248	$23,083	265	$19,282	267	$19,972	273
Totals	**$140,037**	**1,574**	**$275,019**	**3,108**	**$232,641**	**3,234**	**$226,727**	**3,092**

	2012		2013		2014	
Month	**Cost**	**Kwatts (x 10^3)**	**Cost**	**Cost**	**Kwatts (x 10^3)**	**Cost**
1	$19,801	291	$18,894	$19,801	291	$18,894
2	$19,197	279	$15,774	$19,197	279	$15,774
3	$18,576	267	$16,412	$18,576	267	$16,412
4	$19,703	286	$15,893	$19,703	286	$15,893
5	$18,393	264	$18,749	$18,393	264	$18,749
6	$19,250	281	$18,203	$19,250	281	$18,203
7	$18,961	272	$19,381	$18,961	272	$19,381
8	$20,097	293	$18,277	$20,097	293	$18,277
9	$19,404	259	$20,244	$19,404	259	$20,244
10	$16,630	241	$19,315	$16,630	241	$19,315
11	$19,255	266	$19,161	$19,255	266	$19,161
12	$17,438	261	$17,809	$17,438	261	$17,809
Totals	**$226,705**	**3,260**	**$218,113**	**$226,705**	**3,260**	**$218,113**

Best Value Procurement Results within the GSA

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A large government agency, seeking to become more efficient, implemented the Performance Information Procurement System (PIPS) Best Value (BV) process on various construction projects to determine if the program could increase the performance of outsourced services. The impact of this model for increasing the performance of procured projects is presented. The environment of the projects and testing of the process were unique, as they allowed concurrent testing and validation of multiple projects, similar in scope, and uniform application of key performance metrics. A case study is also used to illustrate the overall performance of the BV process. The findings in this paper show that the process resulted in approximately a 60% increase in performance with regards to customer satisfaction, project delays, and cost increases. In an industry with delays in excess of 20-50%, a model that results in an increase of performance for outsourced services is significant.

Keywords: PIPS, GSA, Best Value, Case Study, Performance Results

Introduction

The building industry has been described as inefficient and resulting in many project changes (Ibbs et al. 2007, Thomas 2010, Thomas and Napolitan 1995, and Wambeke et al. 2011). Most of these sources identified the causes of change and risk, but experienced challenges in quantifying the resultant inefficiencies. In practice, large governmental organizations are not perceived as being efficient (Krueger 1991, Riedl 2009, Fahrenthold 2014, Le Grand 1991, Culvahouse 2007). Instead, they are characterized as slow, reactive, and lacking accountability (D. Kashiwagi 2012a, Anonymous 2003, DioGuardi 1995). Another commonly used term to illustrate the hierarchical structure is bureaucratic (Trondal 2012, Sullivan et al. 2011, Howlett et al. 2011). Amid this environment, a large government organization sought a system to promote efficiency of outsourced services and increase performance, the Performance Information Procurement System (PIPS) of Best Value (BV).

Best Value (BV) concepts have been gaining worldwide attention (Van de Rijt and Santema 2012, Adeyemi et al. 2009, Kashiwagi et al. 2011, Kashiwagi et al. 2013) as a business model and methodology to minimize risk on projects via supplier selection, pre-planning and measurement of project deviations. The BV system was originally developed at the Performance

Based Studies Research Group (PBSRG) at Arizona State University (ASU) in 1994. The system has been tested on more than 1500 procurements encompassing $5.7 billion (PBSRG 2012, D. Kashiwagi 2012a) in procured services and construction, with a 98% client satisfaction rate, and a variety of project savings and benefits with utilization of the BV System (PBSRG 2012). Historically, BV concepts have been utilized for the execution of construction, service and commodity contracts, with effects such as improved efficiency and quality (Sullivan 2011, Smithwick et al. 2012, D. Kashiwagi et al. 2012b). As a business model, BV has been well tested in various organizations and sectors (D. Kashiwagi 2012a, Mselle 2009, PBSRG 2012); however, the impact it can have on performance when utilized by large governmental organizations is not as well-known and would provide valuable guidance to large governmental organizations seeking to implement the process.

The questions that this paper addresses are:

1) Can the PIPS BV system be used in a large governmental organization?
2) What is the difference in performance of projects utilizing the PIPS BV system compared to those that did not?

In the following summary and analysis, these questions will be answered as well as recommendations provided.

PIPS Overview

The Performance Based Studies Research Group (PBSRG) is a group of educators and researchers at Arizona State University that have developed tools to improve the procurement, management, and delivery of projects and services. These tools have been packaged together into a process called the Performance Information Procurement System (PIPS). This PIPS process has significantly increased the performance of outsourced projects and services (Little and Kashiwagi 2012, Sullivan et al. 2012, J. Kashiwagi 2012). The process has three major phases that are outlined below:

1) Identification of Potential Best Value. In this phase, vendors or proposers are evaluated based on their cost, schedule, ability to identify and mitigate project specific risks, past performance information of the team, and interview of key personnel. Although similar criteria are found in other selection processes, the manner in which these criteria are collected and analyzed are significantly different.

2) Clarification. Unlike traditional processes that immediately award a contract after evaluations are complete, in the PIPS process, a period of time is set aside to carefully preplan and clarify the project/service. This clarification occurs between the owner/client and the potential best-valued vendor. During this period of time, the vendor proactively

reviews the project to assure that they understand the owner's/client's intent, outlines what is included in the scope, and responds to any questions or concerns that the owner/client may have.

3) Contract Award and Performance Measurement. Upon a successful clarification period, the owner/client has the option to award to the potential best value vendor. Upon a successful award, the awarded vendor is required to submit a weekly risk report that tracks all project deviations with regards to time and money. This report is used to provide an up-to-date analysis of the project on a weekly basis and information to key stakeholders.

The PIPS process has been applied, tested, and refined for over 20 years on over 1,500 projects and services. The program has documented higher success with regards to customer satisfaction, minimizing cost increases, and minimizing schedule delays (Kashiwagi 2010, D. Kashiwagi et al. 2013b, Riley et al. 2012).

GSA Overview

The General Services Administration (GSA) is an agency of the Federal Government that is responsible for managing and preserving $500 Billion in Federal assets. The GSA owns, operates, constructs, and leases 9,600 buildings, which range from courthouses, laboratories, post offices, land ports of entry, and data processing centers. The GSA employs over 12,000 employees and has an annual operating budget of $26 billion (GSA 2012 and 2011). The GSA was experiencing stagnant performance in their source selections regarding procedures and project delivery and was seeking solutions.

Research Partnership

In 2009, the GSA Heartland Region (Region 6) partnered with ASU to assist the Region in increasing performance and efficiency (Kashiwagi 2011b, Meyer et al. 2010). The goal of the research program was to implement the PIPS best-value system to identify if the process could work within the constraints of the GSA and the Federal Government (GSA 2005). The process would have to meet all Federal rules and regulations, would have to be fair and open for all interested vendors, and would have to increase the performance and accountability (on time, on budget, high quality) of construction services.

The process was implemented on several projects, but the largest pilot project was on the Zorinsky Federal Courthouse in Omaha, Nebraska. This project was very sensitive since the courthouse had received negative publicity due to a renovation that was started in 2003. The original renovation was scheduled to cost $41M, but resulted in $18M in cost increases and was completed 4 years behind schedule. Politicians publically criticized the delays and increased costs and used it as an example of the GSA's inability to competently build a building (Glissman

2010). Therefore, the subsequent project would receive increased attention and scrutiny due to poor past performance.

Case Study

After completion of the 2003 renovation, the building tenant became concerned with pedestrian safety. During the winter, melting ice would fall from the building's renovated windowsills and sunshades onto the pedestrian sidewalks. The GSA determined that they would need to install a canopy system around the building to keep the falling ice from injuring pedestrians. The project received approval in April 2010 to be procured, but would have to be designed and installed by December 2010. The total budget was $2.8M.

Due to the highly political environment, the GSA determined that they would use the PIPS Best Value process to select the highest performing contractor and designer to design and install the new canopy system. The procurement process was completed in approximately five weeks. Three design firms and two construction firms competed for the project. In both procurements, the highest evaluated proposal was selected for award. The awarded contractor had the most competitive cost and was approximately 15% below the budget.

As part of the PIPS process, the contractor was required to submit weekly risk reports that documented any changes in time or cost. The final report indicated that there were no (0%) contractor cost increases and only four changes due to scope changes and unforeseen conditions. These changes totaled 1.2% of the projects original awarded cost. At the completion of this project, the GSA Tenant rated the Contractor a 9.0 out of 10 and the GSA Project Manager provided the contractor with a 9.9 out of 10 in terms of customer satisfaction.

Overall Results

The GSA implemented the PIPS Best Value process on 10 construction projects from 2009-2011. Using the Weekly Risk Reports (the third phase of the PIPS process), the GSA was able to document the performance of the projects. The GSA was also able to compare the results to 11 similar Non-PIPS construction projects. These projects were procured under the traditional GSA process, but were required to document their performance using the Weekly Risk Reports. The comparison of PIPS and Non-PIPS projects was distinctive because the projects were similar in size, cost, and scope.

Table 1 provides an overview of the PIPS and Non-PIPS projects. The PIPS program encourages open competition: the average number of proposals received per project increased by 161% when compared to the traditional process. The awarded costs of the PIPS projects were 6% below the budget, which reduced fears that the process would be more expensive (even with

initial cost). The total time to procure a best value project was 10 days longer compared to the GSA's traditional process.

Table 1

Overview of the Pilot PIPS Projects

NO	PROJECT OVERVIEW	NON-PIPS	PIPS
1	Number of Projects	11	10
2	Number of Proposals Received Per Project	1.5	3.8
3	Total Estimated Budget	$ 14,894,840	$ 10,630,102
4	Total Awarded Cost	$ 14,244,385	$ 9,994,887
5	Percent Awarded Below Budget	4.4%	6.0%
6	Average Procurement Time (Advertise-Award)	68 days	78 days

Table 2 illustrates the performance of the pilot projects. PIPS projects had an overall change order rate of 5%, compared to 12% of the non-PIPS process (the overall change order rate includes all owner scope changes, contractor changes, and unforeseen conditions). This is a 63% decrease in overall cost change orders. Similarly, overall schedule delays were decreased by 62% when compared to the traditional process. The GSA Project Managers also evaluated the performance and their satisfaction with the awarded contractors. On average, the GSA Project Managers were 61% more satisfied with the contractors on the PIPS projects versus the Non-PIPS projects.

Table 2

Performance of the Pilot PIPS Projects

NO	PROJECT PERFORMANCE	NON-PIPS	PIPS
1	Total Awarded Cost	$ 14,244,385	$ 9,994,887
2	Total Amount of Cost Increases	$ 1,718,492	$ 616,606
3	Total Percent of Cost Increases	12%	6%
4	Total Awarded Duration	1,822	1,373
5	Total Amount of Schedule Delays	1,606	761
6	Total Percent of Schedule Delays	88%	55%
7	GSA Satisfaction Rating of Contractor	7.1	9.5

Conclusion

Returning to the original questions, the PIPS BV system can be used in a large government organization. The outlined system tracked 10 PIPS projects and 11 Non-PIPS projects to build a

comparison. PIPS BV is in compliance with governmental regulations and does not negatively impact competition.

The process documented that Best Value does not cost more money since the awarded cost of the pilot projects were 6% below the estimated budget. The process did require 10 additional days to procure and award a project due to a detailed project clarification and preplanning phase that are part of the PIPS Best Value process. However, the additional time that was used during procurement resulted in substantial performance increases. The pilot projects showed a 62% decrease in schedule delays (approximately 1,000 days savings) and a 63% decrease in cost change orders (approximately $1.3M). The customer satisfaction ratings also increased by 61% compared to the traditional process.

In 2011, the GSA took over the best-value program after determining that they had received adequate education and training.

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The Best Value ICT Industry

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The ICT industry has struggled with performance in the last 10 years. Tools, processes, and techniques have been developed in attempts to improve performance. Three of the most recent proposed solutions which have shown previous results of success include decreasing the size of projects, using agile project management, and using the best value approach. This paper will focus on differentiating between the three approaches and introduces the latest solution, the best value approach. After analyzing the three approaches, the paper proposes that the best value approach is the only one that requires the utilization of expertise. Using a case study of Schuberg Philis, the paper proposes that the Schuberg Philis model uses the agile approach but has most of the characteristics of the best value approach. In the course of the study and analysis, the Schuberg Philis company has moved from the agile approach to the Best Value approach.

Keywords: ICT industry failure, agile approach, best value approach

Introduction

The ICT industry has struggled with performance since its origins. In 1968 NATO sponsored one of the first major software engineering conferences which addressed what was termed as the "software crisis". The crisis was due to the number of software projects failing to come in on time, on budget, and which met the correct specifications. Proposed causes of failure included (NATO Science Committee, 1969):

1. Complexity of systems.
2. Vendors may lack expertise due to a lack of experience.
3. Rushed projects due to pressure of meeting the owner's deadlines.

The only consensus to these problems at the time was that the solution was unknown. Guidance was given to continue to improve on current techniques and not to work outside the present state of technology (NATO Science Committee, 1969). However studies dating from 1995 have identified project failure rate still as high as 70-84% (De Marco, 1982; Dorsey, 2000; Grossman, 2003; IT-Cortex, 2014; Sauer & Cuthbertson, 2003; Standish Group, 1995). Recent reports have shown little signs of improvement with continuing high failure rate among IT projects (Budzier & Flyvbergj, 2011; European Services Strategy Unit [ESSU], 2007; Geneca, 2011; Government Accountability Office, 2008; McKinsey & Company, 2012; Standish Group, 2013; The Bully Survey, 1998; Venugopal and Suryaprakasa, 2011).

The reports identified the following "failure" or lack of performance statistics:

1. US Accountability office identified 413 IT projects--totaling at least $25.2 billion in expenditures for the fiscal year of 2008--as being poorly planned, poorly performing, or both. With just under half being rebaselined at least once (2008).
2. European Services Strategy Unity reported 105 outsourced public sector ICT projects with 57% of contracts which experienced cost overruns with an average cost overrun of 30.5% and 30% of contracts which were terminated (2007).
3. The Bull Survey performed 203 telephone interviews with IT project managers who took the lead in integrating large systems within organizations in the Times Top 100 and reported that with the IT projects 75% Missed deadlines, 55% exceeded budget and 37% were unable to meet project requirements (IT-Cortex, 2014).
4. Genenca Survey included 600 U.S. businesses IT executives and practitioners and reported that 75% of respondents admit that their projects are either always or usually doomed right from the start, of which 27% always felt this way (2011).
5. McKinsey & Company analyzed over 5400 projects and reported 50% of IT projects on average are 45% over budget, 7% over time, 56% less value than predicted and 17% of projects end so badly they can threaten the life of the company (2012).
6. Flyvbjerg and Budzier's entry for the Business Harvard Review did an analysis of 1,471 IT projects and reported an average cost overrun of 27%, of which 17% had a failure high enough to threaten the company's existence, with an average cost overrun of 200% and schedule overrun of 70% (2011).
7. Venugopal and Suryparakasa's survey of ERP systems reported that 51% of ERP implementations were viewed as unsuccessful, 46% of the participants noted that while their organization had an ERP system in place, or was implementing a system, they did not feel their organization understood how to use the system to improve the way they conduct business (2011).
8. Other findings reported 5–15% of all large-scale software projects are cancelled in the USA (Ahonena & Savolainen, 2010), there is a 50-80% failure rate of large projects (Dulcian inc) and 15% of all software development never delivers anything, and has overruns of 100-200% (DeMarco,1982).

Recently in the Netherlands a parliamentary inquiry was held to address the poor performance of IT projects in the Public space. During the enquiry it was reported that 1-5 billion Euros are wasted with ICT projects annually. Recent and notable projects by the media and government inquiry include (Eye4management, 2014; Plazilla, 2013; Ringelestijn, 2014; Tweede Kamer, n.d., 2014; Viergever, 2014):

1. Defense Department project (SPEER) cancelled after spending € 418 million.
2. Belastingdienst ETPM project cancelled after spending € 203 million.
3. Police Investigation Suite (PSO) Cancelled in 2005 after spending € 430 million.
4. C2000 emergency police and others Implementation costs € 72 million due to delays.
5. P-direct failed tender costs € 200 million with a potential € 700 million more.
6. EPD Electronic Patient File cancelled, after spending € 300 million.

Even more recently, a reported collusion among ICT vendors in the Netherlands has raised concerns about the industry (Zembla, 2014). Kashiwagi had previously identified that the reason for collusion of the construction industry in the early 2000s in the Netherlands, is caused by the following (Kashiwagi D., Kashiwagi, J. and Sullivan, 2013; Rijt and Santema 2013):

1. A nontransparent environment where the client was using management, direction and control [MDC] rather than utilizing expertise.
2. Leveling of the playing field resulting in lower profits, minimized value of vendor expertise, reactive behavior of vendors and minimum standards/expectations being turned to maximum standards by the vendors.
3. Getting work is more important for vendors than doing high performance work.
4. Relationships are used to minimize risk instead of high performance, motivating collusion.

The United States has also experienced a high failure rate with IT projects, reportedly spending billions of dollars on projects which are incomplete, cancelled, or nonfunctional. Recent and notable projects include:

1. USAF attempt to automate and streamline their logistics operations by consolidating and replacing over 200 separate legacy systems. Project cancelled after spending $1.1 billion, project incomplete and non-functional (Institute for Defense Analysis, 2011; Kanaracus, 2012; United States Senate Permanent Subcommittee on Investigations, 2014).
2. State of California attempt to merge 13 separate payroll systems into a single system that served 243,000 employees. Cancelled after spending $254 million, project nonfunctional (Chiang, 2013; Kanaracus, 2013).
3. The Census Bureau attempt to convert to handheld computers for 2010 census. Cancelled after spending up to $798 million, project non-functional (Nagesh, 2008; US Department of Commerce, 2011).
4. The IRS continual attempts to update their system from legacy software. Projects cancelled with over $4 billion spent (Hershey, 1996; Moseley, 2013; Thompson, 2012).
5. The US Government online healthcare website, "Obamacare" was originally budgeted for $93 million. Official statements of costs have not been calculated but estimations calculated it to be as high as $634 million (Costello & Mcclaim, 2013; Dinan & Howell, 2014; Vlahos, 2013).
6. The Federal Aviation Association attempt to consolidate terminal automation system for an initial $438 million; cost increase has been estimated to be $270 million. The project is still ongoing and is currently nonfunctional (Levin, 2013; Perera, 2013).

Why Projects Fail and What Are the Potential Solutions

Among various sources the following are key reasons why projects fail (Al-ahmad et al., 2009; Dorsey, 2000; ESSU, 2007; Gardner, 2000; Geneca, 2011; Glaser, 2004; IT-Cortex, 2014; Kappelman, McKeeman & Zhang, 2009; Mckinsey & Company, 2012; Nato Science Committee 1969; OASIG Survey, 1995; Sauer & Cuthbertson, 2003; Savolainen & Ahonen, 2010; Schmidt, Lyytinen, Keil & Cule, 2001; Standish Group, 1995):

1. Lack of top management / executive commitment and support.
2. Incomplete User Requirements.
3. Misunderstanding of scope/objectives/requirements.
4. Lack of client/end-user commitment/involvement.
5. Changing scope/objectives.
6. Poor planning/estimation.
7. Inadequate project management.
8. Failure to manage end-user expectations.
9. Conflict among stakeholders.
10. "Lack of a clear link between the project and the organization's key strategic priorities, including agreed measures of success.
11. Inadequate resources and skills to deliver the total delivery portfolio.
12. Lack of quality control.
13. Poor / insufficient communication between relevant parties.
14. Confusion around roles and accountabilities.
15. Project complexity.
16. Making an unrealistic tender or agreement due to lack of understanding of the real needs of the customer.
17. Lack of methodology or structure.
18. Introduction of new technology.
19. Change in ownership or senior management.
20. Number of organizational units involved.

The reason for failed ICT projects seems to have the following similarities:

1. Project Complexity.
2. Misunderstanding of scope/objectives/requirements.
3. Inadequate resources and skills to deliver the total delivery portfolio.
4. Changing scope/objectives.
5. Poor planning/estimation.

All five of the reasons seemed to be related to project complexity. On the dual side, project complexity occurs when there is a lack of project expertise. Possible solutions for the ICT project performance should address either project complexity or the lack of expertise. Three solutions that have been proposed to solve the problem of ICT industry nonperformance include:

1. Make projects smaller (Netherlands house of representatives, 2014; Standish Group, 2013).
2. Use agile project management to break project up into smaller milestones/projects to get to the final project deliverable (Cutter Consortium, 2008; PMI, 2014; QSM Associates, 2013; Scrum Alliance, 2013; Serena, 2012; Shine Technologies, 2002; Standish Group, 2011; VersionOne, 2007; VersionOne, 2013).
3. Use the best value approach to deliver the project (Duren & Doree, 2008; Kashiwagi, 2013; Rijt & Santema, 2012).

This paper will address and analyze these proposed solutions.

ICT Industry Structure

The industry structure [IS] diagram (Figure 1) was proposed in 1991 and modified in 2013 to explain the difference between high performance and low performance. The IS diagram was first used in reference to the construction industry. Later research performed in the Netherlands and the States of Oklahoma and Idaho identified that it applied to all industries.

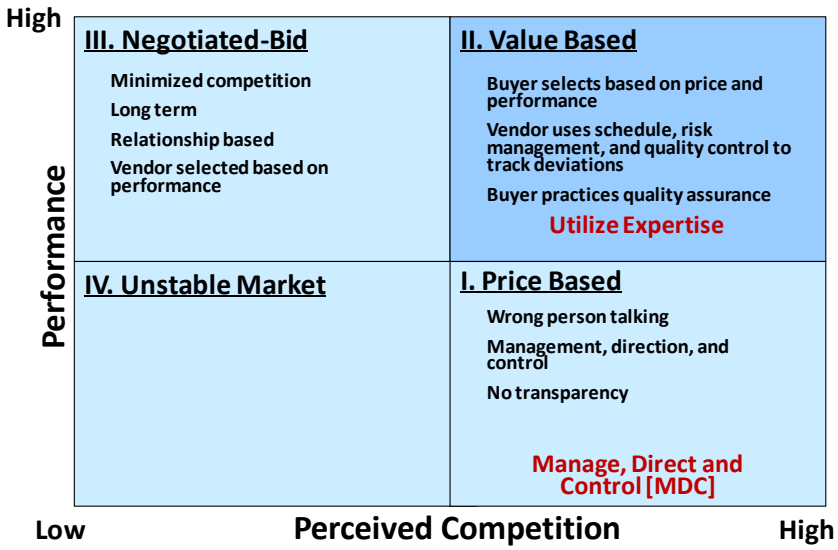

Figure 1: Industry Structure (Kashiwagi, 2014a)

In the low performance environment, the owner/buyer utilizes management, direction and control [MDC] to minimize project risk and ensure performance. In the high performance environment, the owner/buyer utilizes the expert vendor's expertise to minimize project non-performance. If the owner/buyer is using MDC, they are the experts and are hiring vendors that need to be managed, directed and controlled. The communication/direction is in the form of minimum requirements (Figure 2). There is no incentive for vendors to be proactive and increase performance. It forces the client to want higher performance and the vendors to minimize performance. This ensures that all parties protect their own interests, the owners want something better for a lower cost, and the vendors deliver less using the minimum as a maximum.

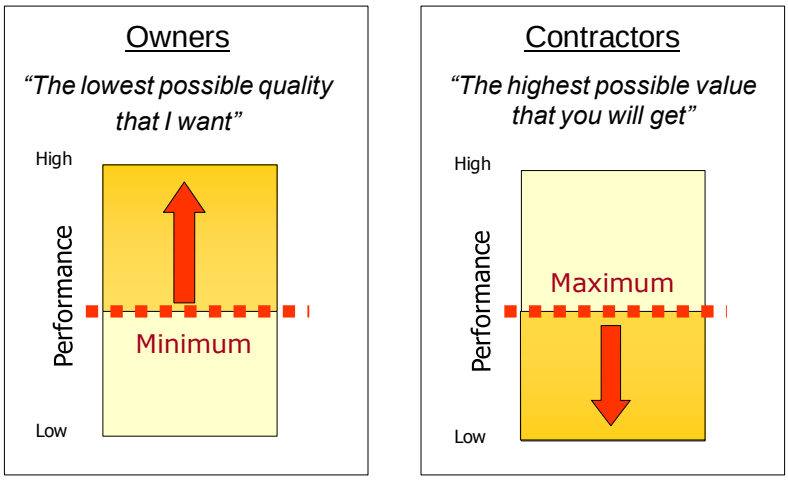

Figure 2: Minimum Requirements (Kashiwagi, 2014a)

The owner/buyer MDC environment has the following characteristics:

1. Owner management, direction and control (MDC).
2. Owner representatives behave as if they are experts [they give the directives and define the scope].
3. Owner MDC environment makes it possible for "less expert" vendors to participate lowering the quality and value.
4. The value of the expert vendors is minimized, and the vendors naturally become reactive, not wanting to "rock the boat" [relationship] and have fear to inform the owner that they are not really the expert or are proposing inaccurate concepts or expectations.
5. All vendors [regardless of capability] are viewed as having the capability to meet the owner driven requirements.
6. Selection is based solely on price and not a vendor's level of expertise [the owner is the expert] or the scope of the delivered service.
7. Because the owner is in control, no performance metrics are tracked. Performance metrics would show the inefficiency of the owner in managing the vendor.
8. If the performance is poor, the owner blames the contractor.
9. Transparency is minimized due to the lack of performance metrics and relationships become more important than being able to perform the work.
10. Price becomes more important than having trained and experienced workers because the owner is the expert and will MDC the vendor labor.
11. Value of vendor's expertise is minimized leading to a degradation of industry capability.

It is important to note that the major problem in the price based environment is the assumption that the owner/buyer is the expert and has the most expertise on the installation and implementation of ICT systems. This is not accurate. The expert is the party who is responsible if there is a technical mistake. The expert is the party doing the quality control. When the party doing the MDC is not doing the actual work, quality control by the expert vendor is replaced by the more inefficient owner's MDC and inspection. This is identified clearly by Deming (1986) as a source of inefficiency and nonperformance.

This owner's MDC environment results in:

1. A price based environment that assumes the ICT service is a commodity, with no difference in performance and no risk.
2. No accountability of the vendors due to the owner/buyer making the decisions and the MDC of work.
3. No vendor technical risk.
4. Reactive behaviors of vendors who are acting in their own best interests, treating the owner's minimum requirements as maximums and driving the minimum requirements lower (Figure 2).
5. Increased transactions and flow of information due to owner MDC (meetings, emails, technical discussions, directions and number of people involved).
6. Inefficiency.
7. Lower profit margins for the vendors, making it difficult to afford experts.

These characteristics match the characteristics of the current IT industry and are a possible explanation of the "complexity" of the industry. The MDC environment also hampers experts, who are more experienced and deliver the client scope at a fixed price [which is not what their competitors are delivering, leading to the perception that they are more expensive]. The expert's competitive advantage is to use their expertise to preplan and do work successfully [on time, on budget, and high value]. In the MDC environment their production and value decreases due to the expert's higher salaries and confusing environment [which increases transactions and down time]; when production goes down, highly expert vendors' costs increases more than vendors using non-expert personnel. This does not motivate the less experienced to become more expert. Instead this results in more reactive behavior by non-expert vendors. The only method to increase the use of expertise is the identification of experts and the utilization of their expertise [the Best Value Environment] (Figure 3).

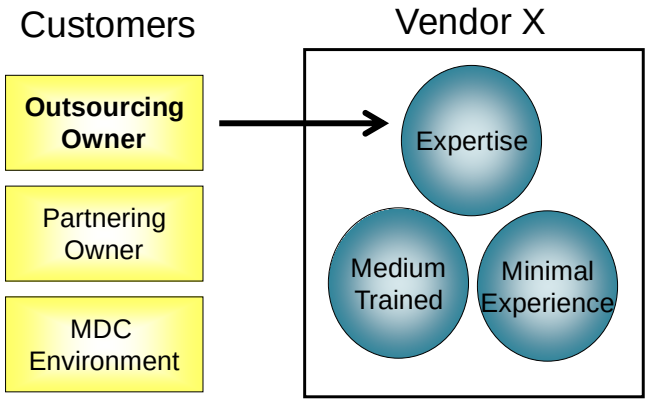

Figure 3: Utilization of Expertise (Kashiwagi, 2014a)

Improvement of Performance by Utilizing Expertise

The industry structure analysis proposes that the method of improving industry performance is to minimize MDC and utilize expertise. This differs from the premises of the other proposed solutions which do not address the MDC issue directly [make projects smaller and less complex and utilizing agile project management]. The authors propose that the agile project management may be the middle ground between the make projects smaller and the best value approach solutions.

Proposal

Identify the differences between the three different proposed solutions, identify the pros and cons and identify statistics or case studies which may support the different proposals.

Methodology

The methodology of this paper will be to:

1. Define the three approaches with assumptions and solution.
2. Identify the difference between the three solutions and the traditional approach.
3. Identify any justifications of the three approaches.
4. Identify case studies that support the justifications.
5. Present conclusion and recommendations.

The paper will analyze the three approaches to improve ICT performance by using the Industry Structure concept of identifying the difference between high performance and low performance by whether expertise is being utilized or if the owner is using management, direction and control [MDC].

Proposed Solution #1: Make Projects Smaller

The simplist solution proposed is to make projects smaller. This is a deductive approach that would minimize project scope in terms of number of stakeholders, time and complexity. The proposal is that smaller projects would be by definition less complex and would result in better results (Standish Group, 2013). The Standish group reports a high level of success with smaller projects compared to large projects with a 66% difference in success rate (Table 1).

Table 1

Large vs. Small Projects

	Small Projects	Large Projects
Success	76%	10%
Fail	4%	38%

Note: Small project are considered <$1M in labor cost, Large project >$10M (Standish Group, 1995)

Additionally when comparing the impact of the two different approaches [traditional waterfall or agile] to project management results (Table 2), a decrease in project size and complexity results in a decrease in the importance of the project management approach or project management expertise (Standish Group, 2011 & 2013). Therefore, with smaller projects, the need for project management expertise is reduced.

Table 2

Large vs. Small Projects Methodology

	All Projects (2011)		Small Projects (2013)	
	Waterfall	**Agile**	**Waterfall**	**Agile**
Success	14%	42%	49%	46%
Fail	29%	9%	8%	6%

Note: (Standish Group, 2011 and 2013)

This approach assumes that the only source of non-performance is complexity and does not address the problems caused by owner management, direction and control [MDC], low level of vendor expertise and the lack of motivation to provide higher levels of quality and value. By definition, this approach assumes that the IT industry may have an insufficient level of expertise

to handle complex projects. This approach also minimizes the competitive advantage of ICT firms that may have expertise and who can perform on complex projects.
Results of another performance study that is done annually to ICT clients/buyers in the Netherlands, gives evidence that the "complexity" proposal that larger and more complex projects have higher non-performance, may not be accurate.

The third party performance measurement firm Giarte, did a recent analysis with the performance rating information they had collected for their 2012, 2013 and 2014 annual reports. Giarte compared the client's satisfaction on large and small projects in the infrastructure management domain from both midsize and large providers (Giarte, 2014).

Table 3

Percentage Satisfied Respondents Infrastructure Management

	Midsize Providers	**Large Providers**	
	Small Deals	**Small Deals**	**Large Deals**
2012	88%	59%	70%
2013	89%	76%	85%
2014	90%	85%	79%

Note: *Deals considered large are >5 million EUR / year, Deals considered midsize are < million EUR / year*
(Giarte, 2014)

From the results the following can be observed (Table 3):

1. Midsize providers in all three years received higher customer satisfaction in their small projects than the large providers for both small and large projects.
2. Large providers for 2012 and 2013 received higher customer satisfaction on their large projects than their smaller projects.
3. In 2013 larger providers received higher customer satisfaction on their smaller projects. However, the only obvious trend is that the performance on smaller projects has been getting better. There are no obvious trends on the performance on larger projects.

From the rating group's analysis it can be proposed that if any conclusion can be drawn, it is that the larger projects have a greater likelihood to have higher performance rather than small projects, and that vendor non-performance may be due to vendors' size [large providers have lower performance on smaller projects] and lack of expertise [most large projects are successful] and not the complexity of the project. These results are supported by a later case study reference of Schuberg Philis, who is the top rated ICT vendor in the infrastructure and application integration business. Schuberg Philis project documentation proposes that:

1. Complexity is caused by a lack of expertise and planning.
2. Size of projects does not affect project performance although larger projects may need more attention.
3. This is supported with their performance on ICT projects.

The information and discussion on the proposal to make ICT projects smaller to increase their performance has the following conclusions:

1. Making projects smaller results in minimizing the importance and need of ICT vendor expertise.
2. It gives the competitive advantage to vendors with minimal expertise.
3. It makes price a more important factor.
4. It uses relationships and working together as the methodology for successful performance.
5. It does not identify a potential source of non-performance as the owner using MDC to minimize risk.
6. It does not help the industry to improve their level of expertise.

Solution #2: The Utilization of the Agile Project Management Approach

In 2001, 17 software developers with a wide range of expertise in software development created the guidelines to what is known as the agile software development manifesto. The manifesto gave 12 principles of agile that focused on three main points (Beedle, et al., 1999):

1. Teamwork and collaboration: This has a focus on daily interaction and face to face communication.
2. Continuous, steady, and an iterative pace: Involves welcoming changing requirements, adaptive team behavior and frequent piece by piece delivery of working software until project completion is reached.
3. A high level of quality: Technical excellence achieved by self-organizing teams, with motivated individuals and utilization of simplicity.

The approach of agile is now applied to various different methodologies such as Dynamic Systems Development Method (DSDM), Extreme Programming, Lean Software development, Kanban, and SCRUM. All methodologies differ in application details but remain consistent with the general agile principles. SCRUM, reported to be used by over 70% of the IT industry (Scrum Alliance, 2013; VersionOne, 2013), and has been defined by the Scrum Alliance to be:

"founded on an empirical process control theory, or empiricism. Empiricism asserts that knowledge comes from experience and making decisions based on what is known. Scrum employs an iterative, incremental approach to optimize predictability and control risk."

Agile has become mainstream in the IT sector with as high as 84% of IT companies practicing agile methodologies and over 5,000 PMI certified practicioners, making it the fastest growing PMI certification (Project Management Institute, 2014; Scrum Alliance, 2013; Serena, 2012; VersionOne, 2013). The greatest concerns of those adopting agile include (VersionOne, 2013):

1. Lack of upfront planning.
2. Loss of management control.
3. Management opposition.
4. Lack of documentation.
5. Lack of predictability.
6. Lack of engineering discipline.

Agile is used as an alternative to traditional methodologies such as the waterfall approach. The difference between the waterfall approach and the agile approach is that the the waterfall approach is linear and a single iteration for the entire project (Figure 4). Each waterfall step can be treated as an entire project in the Agile approach. A complex system can be broken up into simpler segments or components, and each component becomes its own project. This allows the testing of a component to be successfully accomplished before moving on to other components. It allows components to be done simultaneously. Agile simplifies by allowing ICT experts to focus on one component at a time, instead of attempting to factor in many components and their interfaces at the same time. To simplify is intelligent. To simplify by treating a component is similar to proposal #1: Make the Project Smaller. The Agile approach minimizes the need of expertise. If an expert vendor did a project, they could be doing the agile approach in their mind as they did the waterfall approach. An expert in the ICT industry is using both the waterfall and the agile approaches.

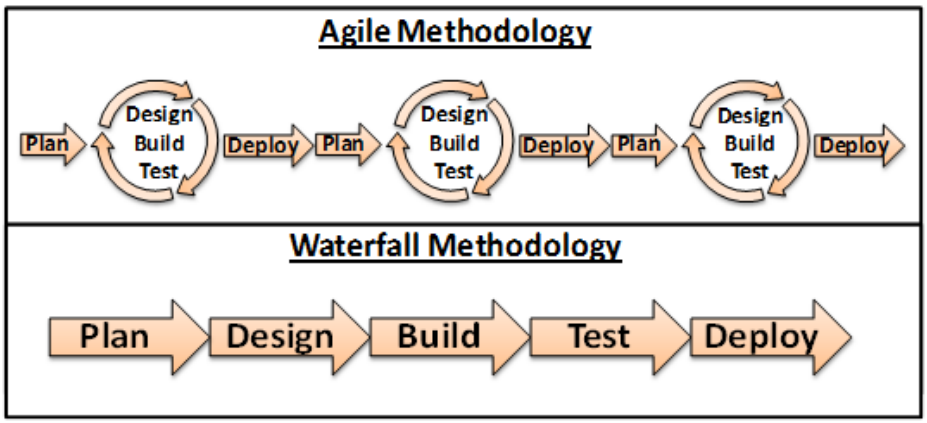

Figure 4: Agile vs. Waterfall

In comparing methodologies the Standish group found that Agile had a success rate 28% higher than the traditional waterfall approach (Standish Group, 2011). Various other reports and surveys support the Standish group with claims of improvement in cost, time to market, risk, defects and productivity when switching from traditional methodologies to agile (Cutter Consortium, 2008; QSM Associates, 2013; Scrum Alliance, 2013; Shine Technologies, 2002; VersionOne, 2007).

Solution #3: the Best Value Approach

The best value approach was first conceived by Dean Kashiwagi, at Arizona State University (ASU) in 1991 as part of a PhD dissertation (1991). The best value (BV) Performance Information Procurement System (PIPS) was originally, limited to a selection/procurement process, then matured into a project management and risk management approach. The BV PIPS was first tested in 1994 by the Performance Based Studies Research Group (PBSRG) at ASU (Kashiwagi & Savicky 2002) and was used to select roofing systems and contractors for private organizations in the Phoenix, Arizona and Chicago, IL area (including: Intel, IBM, and McDonald Douglas). Due to the simplicity of the system and drastic improvements made on performance and value, the system quickly spread to other construction and facility areas.

The BV PIPS approach has been heavily documented. Facts of the BV PIPS system research include (PBSRG, 2014):

1. Researched and developed (1992-present) at the Performance Based Studies Research Group (PBSRG) at Arizona State University (ASU).
2. PBSRG has received a total of $15.9 million in funding with 313 grants.
3. Most licensed university developed technology at Arizona State University with 38 licenses issued by the innovation group AZTech at Arizona State University. PIPS tests have been conducted in 31 states in the U.S. and five different countries besides the U.S. [Finland, Botswana, Netherlands, Canada, and Malaysia].
4. Documented performance of over 1,700 projects delivering $6 billion (1629 projects, $4B in construction and 89 projects, $2B in non-construction), customer satisfaction of 9.8 (out of 10), 93.5% of projects on time and 96.7% on budget.
5. Research's most dominant results include: Arizona State University business services and procurement department testing the PIPS system and generating $100M of revenue based on the method in the first three tests, and currently observing $110M a year from using the method (Kashiwagi 2014).
6. Research tests show that in procuring of services outside of construction, the observed value is 33% or an increase of revenue or decrease in cost of 33% (Kashiwagi, J., 2013).
7. Minimization of up to 90% of the client's professional representative's risk management efforts and transactions due to reduced risk levels and the transfer of risk management and accountability to the vendors. This is the only documented reduction in management in the construction management industry.
8. The results of PIPS testing has won the 2012 Dutch Sourcing Award, the Construction Owners of America Association (COAA) Gold Award, the 2005 CoreNet H. Bruce Russell Global Innovators of the Year Award, the 2001 Tech Pono Award for Innovation in the State of Hawaii, along with numerous other awards.

The former Associated Vice-President of Arizona State University Business Services, Ray Jensen (Kashiwagi, 2013), who led ASU to deliver $1.7B of services at ASU, commented on PIPS:

"I have been successful in the business of procurement and services delivery for the past 30 years. I saw in PIPS, improved solutions of performance/contract administration issues that are so dominant, that I am willing to change my approach to the business after 30 years."

The BV PIPS system has been analyzed by outside groups multiple times in the last 17 years. However, there were two investigations that performed a thorough study on the impact and effectiveness of the PIPS system:

1. The State of Hawaii Audit (Kashiwagi et al. 2002; State of Hawaii Report 2002 (DIS)).
2. Two Dutch Studies on the Impact of PIPS (Duren & Doree, 2008; Rijt & Santema, 2012).

These studies all confirmed that the performance claims of the PIPS system were accurate. Duren and Doree's study found the following for PIPS projects performed in the United States:

1. 93.5% of clients who worked with PIPS identified that their projects were delivered on time.
2. 96.7% of clients who worked with PIPS identified that their projects were delivered within budget.
3. 91% of the clients stated that there were no charges for extra work.
4. 93.9% of the clients awarded the supplier's performance with greater than an 8 rating (on a scale from 1-10, 10 being the highest performance rating).
5. 94% of clients would hire the same supplier again.

Best Value Concepts

The BV approach has a selection phase [selects the expert vendor], a clarification phase [expert vendor clarifies their plan in detail] and an execution phase where the expert vendor manages their project. The BV approach uses the following concepts (Kashiwagi, 2014):

1. Requires the owner to hire an expert vendor.
2. Identifies the buyer/owner as the major source of project cost and time deviations.
3. Identifies owners' management, direction and control [MDC] as a source of project risk.
4. Identifies that decision making should be minimized and done by the expert vendor.
5. Replaces owner/client MDC with the utilization of expertise.
6. Proposes that the language of communication between client/owner and expert vendor should be a language of metrics.
7. Defines experts as not having technical risk. The only risk they have is risk that they do not control (source is the other stakeholders).
8. Expert vendors use transparency and not control to identify and mitigate the risk that they do not control. This risk is always non-technical risk.
9. Transparency is when all stakeholders can see future risk even if they do not understand its cause.
10. Experts identify the project deliverable in terms of non-technical requirements and metrics, and work the solution from the end to the beginning.
11. Experts also identify the risk that they do not control and the required risk mitigation and use their expertise to create information that is insufficient or unknown to complete their plan.
12. Experts are hired for their plan or scope. They are not financially responsible for deviations to their plan caused by unforeseen conditions or risk that the expert vendor does not control.

The BV approach differs from the traditional "waterfall" process in the following ways:

1. The expert vendor is responsible for determining the final scope.
2. Owner decision making and MDC is minimized. Owner participation is led by the expert vendor.
3. The expert vendor does risk management of risk [which they do not control] during the execution phase.
4. Owner should not hire vendors with technical risk.
5. Experts are required to have a complete plan which meets the requirements of the owner in detail including a milestone schedule, risk and risk mitigation, and assumptions where there is insufficient information.

The biggest difference between the BV and the Agile approach is that the BV approach requires an expert vendor with expertise who can see the entire project from beginning to end before the project is started. The BV approach maximizes pre-planning and planning utilizing the expertise of the expert vendor. The expert vendor must also manage the entire project and create transparency that minimizes the need for the owner to understand the technical requirements of

the project. The BV approach also has a structure that enforces that an expert is selected. The structure includes a selection phase and a clarification phase that forces the following actions for the expert vendor:

1. The expert uses metrics to first identify the project deliverable and get consensus from all stakeholders.
2. The expert has a complete plan [includes a detailed schedule, cost and a milestone schedule].
3. The expert must identify, mitigate and track risk [that they do not control] including unforeseen conditions.
4. The expert works backwards from the deliverable, to identify all other requirements in their project plan.
5. The expert tracks all project deviations from their project plan.
6. The expert creates transparency that allows the owner/client to see clearly into the future to the end of the project, minimizing the need for the owner to get involved in the management of the project.

The best value process was utilized in two six year longitudinal studies [Users in the state of Minnesota and the U.S. Army Medical Command (Table 4 and 5). The two studies resulted in the following conclusions (Sullivan et al 2005; Kashiwagi 2014; Kashiwagi et al. 2009):

1. The owner and their representatives were the biggest source of project deviations.
2. The BV structure minimized the cost and time deviations.
3. The vendor performance was outstanding.
4. Cost was minimized and within the budgets.

Table 4

U.S. Army Medical Command Best Value Performance

Completed Projects	NTP 2007	NTP 2008	NTP 2009	NTP 2010	NTP 2011
# of Projects	110.00	129.00	122.00	92.00	27.00
Original Awarded Cost ($M)	$181.9	$177.3	$184.0	$107.1	$16.3
Final Awarded Cost ($M)	$193.9	$187.8	$192.6	$111.0	$16.4
Total Over Budget ($M)	$11.9	$10.6	$8.6	$3.9	$0.74
Total % Over Budget	**6.56%**	**5.96%**	**4.68%**	**3.61%**	**0.46%**
% due to owner	4.58%	5.59%	3.61%	2.36%	0.46%
% due to Designer	0.00%	0.14%	0.00%	0.21%	0.00%
% due to contractor	0.11%	-0.17%	-0.01%	0.08%	0.00%
% due to unforeseen	1.88%	0.40%	1.09%	0.96%	0.00%
Total % Delayed	**51.56%**	**48.43%**	**36.77%**	**28.53%**	**3.31%**
% due to owner	41.38%	39.96%	28.51%	16.53%	9.20%
% due to Designer	0.00%	0.49%	0.00%	1.32%	0.00%
% due to contractor	1.86%	-0.02%	1.29%	0.12%	-6.40%
% due to unforeseen	8.32%	8.01%	6.97%	10.56%	0.51%

Note: (Kashiwagi, 2014a)

Table 5

State of Minnesota Best Value Performance

General Overview	Overall	Group A	Group B	Group C	Group D	Group E	Group F	Group G
Total Number of Projects	399	1	8	21	10	3	355	1
Total Awarded Cost ($M)	$434.9	$0.19	$37.8	$17.2	$5.1	$29.5	$332.7	$12.4
% where BV was lowest cost	54%	0%	83%	42%	33%	33%	55%	0%
Overall $ Change Order Rate	**8.83%**	**-**	**3.73%**	**4.04%**	**1.27%**	**2.54%**	**10.16%**	**4.53%**
Client	7.61%	-	2.15%	1.08%	0.33%	0.34%	8.83%	1.16%
Designer	0.69%	-	1.68%	2.07%	0.63%	1.57%	0.33%	2.55%
Contractor	0.01%	-	-0.21%	-0.17%	0.00%	0.00%	0.01%	0.21%
Unforeseen	0.52%	-	0.12%	1.06%	0.31%	0.63%	0.51%	0.62%
Overall Schedule Delay Rate	**47.17%**	**-**	**35.31%**	**1.59%**	**16.38%**	**7.44%**	**51.68%**	**12.73%**
Client	21.92%	-	15.26%	0.00%	7.41%	3.93%	24.13%	5.45%
Designer	4.47%	-	5.69%	1.59%	8.97%	0.00%	4.48%	7.27%
Contractor	2.65%	-	10.93%	0.00%	0.00%	3.51%	2.42%	0.00%
Unforeseen	4.54%	-	3.42%	0.00%	0.00%	0.00%	5.04%	0.00%
Number of Satisfaction Surveys	**233**	**0**	**2**	**18**	**0**	**0**	**212**	**1**
Vendor	9.5	-	9.0	9.9	-	-	9.5	8.8
Selection Process	9.7	-	8.5	10.0	-	-	9.6	10.0

Note: (Kashiwagi, 2014a)

These results were reconfirmed in the first large Dutch test by the Rijkswaterstaat on the $1B fast track projects in 2008. The projects minimized procurement time, cost and transactions by 50%

reduced construction time by 25%, and identified that the major source of project cost and time deviations were caused by owner decision making and management, direction and control (Kashiwagi et al. 2013; D. Kashiwagi and J. Kashiwagi 2013).

State of Oklahoma History with Best Value Approach

In the four years the State of Oklahoma has been using the PIPS and changing their buying paradigm, they have achieved the following (Kashiwagi, 2014):

1. Convinced the State Legislature to pass law allowing them to run BV PIPS on construction projects.
2. Convinced major government organizations to use PIPS in the purchasing of service (department of health care services, tax commission, department of commerce, department of corrections).
3. Created a weekly risk reporting system and best value industry group.
4. Ran over 19 best value projects on 13 different types of services.
5. Users were happy with results (Table 6).

The following is a list of different services the State of Oklahoma has implemented PIPS/PIRMS:

1. Commercial Off the Shelf (COTS) Tax Software.
2. Enhancement of Workforce Job Website.
3. Electronic Document Management for Construction Documents.
4. Computer to Plate Printer.
5. State wide light bulb and lighting fixture contract.
6. Emergency hazardous Waste Removal contract.
7. State Mental Health Services.
8. Performance Measurement of Federal Grants.
9. Juvenile Center and Services (cancelled).
10. New construction and renovation projects.
11. Design Services.
12. Construction Management Services.
13. Commissioning Services.

The following Table 6 shows a summary of the results of the PIPS/PIRMS implementations.

Table 6

State of Oklahoma Best Value Performance

State of Oklahoma Central Purchasing Best Value Project Results	
Total # of Best-Value Procurements	30
# of projects in process	7
# of completed projects	23
# of different services procured	12
% Where identified Best-Value was lowest cost	92%
Estimated $ of BV projects procured	$ 141.1M
Estimated $ cost avoidance	$ 71.8M
Average customer satisfaction	9.4

Note: State of Oklahoma Central Purchasing. (2014).
Director's Report [Data file], retrieved from Hagar November 11, 2014

The State of Oklahoma procurement group minimized 34% of the cost of the projects by using the BV PIPS approach. The clients are satisfied [9.4/10.0 satisfaction rating].

COTS-ITS Tax Software

After implementing the PIPS/PIRMS on a wide variety of services, the State of Oklahoma agreed to implement PIPS on a large ICT project. The Oklahoma Tax Commission identified a need to update their outdated tax software and processes. The Agency estimated the cost of this project at $40M. The decision to implement PIPS/PIRMS on the project was made in the Spring of 2010 (Kashiwagi, 2014).

The agency's expectations were as followed:

1. To consolidate their different processes into one system.
2. To automate as many manual processes as they could.
3. The Supplier would be able to implement changes despite multiple technology constraints.
4. Minimal customizations and adjustments of the future software.
5. The software was to be upgradeable in the future.

The project would task the supplier with implementing a developed and commercially offered Commerical off the Shelf Integrated Tax Software (COTS-ITS) as the primary technology tool to manage all taxpayer data and account information, to include (Kashiwagi, 2014):

1. Taxpayer Registration.
2. Account Management.
3. Returns & Payments.
4. Credits & Refunds.
5. Transaction Posting.
6. Correspondence & Case Management Inquiries.
7. Info Mngmt & Reporting, Accounts & Periods.
8. Retrieval, Streamline Sales Tax (SST).
9. Web-based Functionalities.

10. IRS Modernized eFile (Mef) Auditing.
11. Apportionment and Compliance Functions.

The supplier would also need to have a proven product that would include the ability to successfully implement the following tax types:

1. Individual Income.
2. Corporate Income.
3. Sales, Use, Franchise.
4. Mixed Beverage.
5. Withholding.
6. Waste Tire.
7. Telephone Surcharge.
8. Vehicle Rental.
9. Coin Device.
10. Cigarette/Tobacco/Alcohol.

In the BV approach, the owner must determine what they "think they want", but not being the expert, the Best Value expert supplier is required to create the scope of the project. The expert's proposed scope must be acceptable to the owner. The RFP went from over 15 pages down to 1 page. The Tax Commission realized that if they minimized their MDC, the expert vendor had more flexibility to utilize their expertise.

The Awarded Supplier was Fast Enterprises LLC (Firm A). The supplier had ranked #1 in every category in the selection phase (see Table 7). The awarded amount would end up being $24,989,400 [budget of $40M]. The supplier was given an additional $8M from their original bidding price due to value added options.

Table 7

Selection Phase Criteria

#	Criteria	Firm A	Firm B	Firm C	Firm D
1	Cost Proposal ($M)	$16.98	$34.39	$28.60	$66.76
2	Interview Rating	180	105	106	45
3	Technical Risk Plan	65	28	40	35
4	Risk Assessment	70	32	36	40
5	Value Added	60	28	45	40
6	Measurement Plan	60	36	32	32
7	Schedule	45	32	40	40
8	Average PPI Score (Vendor)	9.6	8.9	9.4	8.8
9	Average PPI Score (PM)	9.5	9.1	9.34	8.46
10	Average PPI Score (Regional VP)	10	9.4	7.95	8.76

Note: (Kashiwagi, 2014a)

The selected best value supplier was able to successfully develop the clarification period documents and was awarded the contract in less than 2 months. The project finished on time and on budget with no change orders. The expert vendor cut the government's cost by 40%. The Tax software project and the work done at the State of Oklahoma reinforced the concepts of the best value approach:

1. Owner is not the expert.
2. Best Value vendor will determine the appropriate scope of the project.
3. The client is the biggest source of project cost and time deviation.
4. The expert utilizing their expertise can increase the performance of projects.

5. The cost of the owner's MDC is dominant and could be reduced significantly with the best value approach.

Arizona State University History with Best Value and the IT Networking Contract

The second case study of an ICT project delivered by the BV approach, is the ASU IT network outsourcing at one of the largest university networks in the United States, consisting of:

1. 4 different campuses, 83,000 Students and 12,000 Faculty.
2. Estimated Cost: $12.9 Million.
3. Number of UTO/IT employees: 18 Full-time employees, 8 Students, 3 Contract technicians.

Arizona State University (ASU) decided to utilize the best value PIPS in 2008 to procure IT Networking maintenance services (Kashiwagi 2014). ASU decided to use the best value approach after using it to procure food services and sports marketing services. In both procurements, ASU received outstanding value. The food services contract delivered $32M from the high performance vendor to work in the new environment shaped by the best value approach (Michael, Sullivan and Kashiwagi 2008).

The ASU IT Networking outsourcing was a unique case study for the following reasons:

1. Complexity was high. The requirements or state of their networking system were not known by the client/user.
2. The management was changed during the 3.5 years of the best value vendor's tenure.
3. The new management accused the vendor of nonperformance and high prices.
4. The vendor used their metrics to create transparency and mitigate the client dissatisfaction. Instead of the client recompeting the contract, the client decided to renew the contract for another five years.
5. The vendor understood that if they provided transparency through metrics, the complexity and confusion which often happens between the client and the vendor is simplified.

The head of ASU University Technology Office (UTO) had a difficult time getting information from his own staff. The following was transpiring (Kashiwagi, 2014):

1. He had been trying for two years to define what the IT networking services included in terms of requirements and resources, and had not been successful.
2. He requested from his staff a vision of what it would take to transform the antiquated system to a system deserving of a Level 1 research institution.
3. He received no proposals. Answers he received included, "No one has all the information." "No one can control the system." "No one has enough control over the network." "The problem is too complex."

He asked the Director of PBSRG the following questions and received the answers (answers are in parenthesis) (Kashiwagi, 2014):

1. When applying the best value PIPS approach, does the user/buyer have to know what they need?
   (Answer: no.)
2. Will the best value approach find the optimal answer? (Answer: yes.)
3. Will the best value approach answer have metrics that can be easily understood? (Answer: yes.)
4. Will the best value vendor identify how they will modernize ASU's system? (Answer: yes.)
5. What if no vendor proposes a better solution than the current performance? (Answer: then what the university is currently doing is the best value option.)

The UTO Director immediately agreed to use the BV Approach. The process would utilize expertise to identify the current state of the ASU IT systems with metrics, identify what to improve and provide a strategic plan to get it accomplished.

After the ASU/UTO decided to use the BV approach, they invited all potential suppliers of the service for an education briefing of the approach and the process. At the end of the briefing the vendors were asked to fill out a survey evaluating the new BV process compared to the traditional selection process. The average vendor responses are shown in Table 8.

Table 8

Traditional Procurement Process vs. Best Value PIPS Process

#	CRITERIA	UNIT	BV PIPS Process	Traditional Process	Difference
1	The process is able to identify the vendor that can deliver the best performing IT service.	(1-10)	7.6	4.9	2.7
2	The process focuses selection on a vendor's proven ability to perform	(1-10)	8.1	5.0	3.1
3	The procurement process requires minimal amounts of resources for qualified vendors to bid.	(1-10)	6.5	4.1	2.4
4	The process is fair and allows all vendors equal opportunity to be selected	(1-10)	7.0	5.2	1.8
5	Relationships and marketing is the main factor in selection	(1-10)	4.0	7.5	-3.5
6	The process allows the vendors to differentiate themselves by their ability to perform	(1-10)	8.2	5.3	2.9
7	The process forces the vendors to make a proposal that is easy for the client to understand.	(1-10)	7.9	4.0	3.9
8	The process allows the vendor to submit a proposal that is in both the best interest of the client and the vendor.	(1-10)	7.5	4.7	2.8
9	The process allows the vendors to regulate the performance level needed to be selected for the service.	(1-10)	7.7	4.9	2.8
10	The process allows a vendor to submit a proposal that is accurate to the expectations of the client.	(1-10)	7.3	5.1	2.2
11	The process allows the vendor to be more creative and inventive with their proposals, allowing them to give clients more options for their service.	(1-10)	7.5	5.2	2.3
12	The process is simple and easy to understand	(1-10)	7.9	4.6	3.3
13	The process increases competitiveness of high performing vendors.	(1-10)	7.1	5.4	1.7

14	The process favors the vendors that have an understanding of how to accurately measure their performance.	(1-10)	8.1	3.9	4.2
15	Your overall satisfaction of the process	(1-10)	7.9	3.7	4.2
16	Total Number of Surveys	#	11.0	11.0	0.0

Note: (Kashiwagi, 2014a)

The IT vendor's perception of the BV approach was that:

1. PIPS showed a 27% improvement to find a qualified vendor.
2. Vendor's proven ability is 21% more important with the BV approach.
3. PIPS system decreased the value of marketing and relationships by 35%.
4. The PIPS process is 33% more simple.
5. The BV process increases the competitive advantage of performers by 42%.
6. The IT vendors were 42% more satisfied with the BV PIPS process.

The ASU IT networking system was fragmented, antiquated and had poor performance. Due to the restricted budget [$12.4M], outages were occurring, however there was no documentation on the outages or the bureaucracy of the ASU UTO environment. Only one vendor submitted a proposal.

Due to the transparency of the process the procurement agent and client were totally satisfied. The bidding vendor did not realize they were the only bidder. The other major vendors identified that they could not be cost competitive. A survey was performed to identify why the other vendors did not bid on the project. Three of the other major vendors responded with the following explanation for not bidding:

1. Risk is too high for the vendor.
2. ASU bureaucracy is a formidable risk to overcome.
3. Projected profit in the project to offset the risk is not sufficient.

The BV vendor was then asked to write their own detailed level of service, measurement of the service, risk management plan, and weekly risk report. This was compared to the Universities in-house cost and plan.

The best value vendor's cost was $2M below the cost of the university in-house operations (Table 9). The vendor minimized the labor cost, minimized the management cost, but still provided an increase in service. The greatest value-add was improving the procurement ratio of amount spent on new equipment instead of maintenance costs from the university's spend rate of 6%/94% to their proposed rate of 19%/81%.

The UTO Director had been trying to make the transformation to a more efficient, measured, value added structure for the past two years, but was not successful within the bureaucracy of the university. Now the entire system was measured. The vendor was not only providing every critical measurement that was requested, but also measuring against other major universities to ensure cutting edge IT Networking services. The UTO Director's statements, three months after the vendor took over the ASU IT network, were (Kashiwagi, 2014):

1. "Am I dreaming? Am I missing something? When do all the problems begin?"
2. "Am I missing something, or have we just made one of the biggest changes with no problems?"
3. "This is an unqualified success.....!"

Less than a year later, the senior manager of ASU/UTO moved to a different position at ASU. The new management was more MDC oriented. As time moved on, the vendor was directed to stop the constant use of metrics and to stop measuring the performance at other universities. However, PBSRG, the Best Value experts instructed the vendor to continue to keep and post their metrics internally. At the same time, the ASU Director of Procurement was promoted to the Senior Business Manager position, and ASU hired a new director of Procurement.

By 2013 both the new ASU procurement office and the new UTO group were questioning the performance of the BV IT vendor. They proposed that the contract would not be renewed in 2014, and the contract should be recompeted. The following reasons for non-performance were given (Kashiwagi, 2014):

1. There were too many outages and the vendor was the reason for the outages.
2. The BV vendor was overcharging for services.
3. The BV vendor was not billing accurately.
4. The ASU users of the IT networking were dissatisfied.
5. The UTO office had to use MDC [2012-2013] to keep the service acceptable.
6. The BV vendor was not acting like an expert vendor in keeping ASU in the forefront of technology. They were viewed as reactive and not moving ASU to the latest technology.

The level of the degree of disagreement on the performance of the vendor was so high that the differences seemed irreconcilable. PBSRG recommended that the contract should be competed again. PBSRG proposed that this was not only in the best interest of ASU/UTO [who felt they were being cheated] but in the best interest of the vendor who thought they were delivering high performance services. PBSRG proposed to the ASU Procurement Office and the ASU UTO office that the performance metrics should be reviewed before any action was taken. Everyone agreed and the vendor presented their performance metrics in the fall of 2013 (see tables 9 and 10) (Century Link, 2013). The performance metrics were so dominant; it changed ASU/UTO's position. They dropped their request to re-compete the service, and renewed the contract with the BV vendor for another five years.

Table 9

Century Link Best Value Performance

	Before CL	**CL (2010) Contract Agreement**	**CL (2013) 3rd year Performance**
Business Costs			
MSA Baseline	$12.29M	$10.81M	$11.96M
Growth – Out of Scope	N/A	N/A	$1.15M

Value Add	N/A	$0.43M/yr	$0.98M/yr
Net MSA	$12.29M	$10.38M	$9.83M
Reliability and Satisfaction			
# of Major Outages	N/K	37	11
% Uptime	99.802	99.989	99.998
Customer Satisfaction (max 4.0)	3.6	3.71	3.81
% of Tickets within SLA	0.94	0.97	0.97
Technology			
% Network supported (Not at end-of-maintenance)	0.89	0.99	0.99
% 1Gb- Wired Connections	0.57	0.715	0.96
% Wireless(n)	0.09	0.087	0.926
IT Spending Ratio (New vs. Maintenance)	6/94	26/74	56/44

Note: Century Link (2013, September 17)

Table 10

Vendor Upgrades to Network Management Processes and Security

Before CL	**CL 3rd year results**
Manual KPI tracking	On-line KPI tracking
Informal Change Management	Formal Change Management Process
Manual Project Tracking	Sharepoint
Single level of Engineering Review	Multiple levels of Engineering Review
No Redundancy Testing	Bi-annual testing
Minimal Security Setup	NG - Firewalls, Segmentation, Malware Protection, Logging

Note: Century Link (2013, September 17)

The presentation of the metrics confirmed the following:

1. Metrics assists the best value vendor clearly identify their performance.
2. Metrics allow a vendor to plan ahead.
3. Metrics creates transparency, and stops win/lose behavior.
4. Performance metrics protect the vendor, as well as the owner/user from themselves.
5. MDC creates confusion, non-transparency and an inaccurate picture of reality.
6. Documentation utilizing metrics of the vendors protects the vendors against abuse.
7. Selecting a BV vendor, allowing the BV vendor to use metrics to identify their performance and minimizing deviations, validated the BV approach.

The BV vendor's presentation utilizing the performance metrics along with accompanying documentation at the time of award, and during the lifetime of the contract, made the following very clear:

1. The BV vendor was a very high performance vendor, who provided services to the highest level, while reducing the costs.
2. The vendor took over the antiquated ASU IT networking system "as is."
3. The vendor made drastic improvements to the ASU network system.
4. The client wanted even higher performance during the contract years.

5. The BV vendor reduced the cost by 25% ($2.8M/year).
6. The BV vendor upgraded all points to 1MB connects, and transformed the campus into a wireless environment.
7. The vendor increased the supportability of all networking to 99% even though most components were no longer being manufactured.
8. The vendor changed the spend ratio (maintenance/new equipment) from 6%/94% to 56%/44%.
9. Outages decreased by 67% and ASU/UTO was responsible for all outages.
10. Customer satisfaction increased.
11. The BV vendor raised security levels, and made it possible for any UTO personnel to get access to the metrics information on the internet.
12. The requirement created by ASU/UTO (that was not in the contract) that the BV vendor was responsible for upgrading the technology and systems every year was not a valid requirement.

The ASU IT Networking Services delivered by the Best Value approach was unique in the following ways (Kashiwagi, 2014):

1. The best value approach was fully utilized to deliver ITC services.
2. The owner did not know the state of their IT Networking system [they were not the expert].
3. The results of the BV delivery were identified as successful by all parties.
4. The ASU/UTO leadership delivering the best value results was separated, and a new group that was more comfortable with the traditional MDC took over, causing confusion, nontransparency, and questioning the success of the BV vendor.
5. The BV expert vendor used their metrics to create transparency. Even the MDC owner agreed that the vendor was a high performer.

Even though the client in the execution phase attempted to return to the traditional MDC approach, the BV vendor unilaterally ran the BV approach, and their metrics and documentation and understanding of the BV approach allowed them to utilize their expertise, increase performance and deliver the best value at the lowest cost. When they could not control the owner, they documented the actions of the owner which clearly showed the owner made decisions, overrode the expertise of the vendor, and therefore were liable for the poor performance and risk that the vendor could not control.
This case study showed the following (Kashiwagi, 2014):

1. The ICT vendor was an expert.
2. The owner utilized the expertise of the expert ICT vendor.
3. The ICT vendor lowered the cost and raised the level of performance of the client's IT networking system.
4. When the owner and vendor disagreed on the level of performance, the expert vendor utilized metrics to show performance.
5. The metrics created transparency and allowed everyone to understand the performance of the IT vendor was spectacular.
6. The owner rehired the BV expert IT vendor.

Even in a confusing state, where the owner and the vendor disagreed on performance, the metrics created transparency and both parties agreed that the vendor was a high performance BV vendor. All the BV concepts were documented in this case study.

Schuberg Philis Case Study

In 2013, Schuberg Philis [SBP] was introduced to the BV approach. They immediately gravitated to the BV concepts due to a high similarity to the SBP approach to delivering ICT services. The authors had interest in SBP as a case study for the following reasons:

1. Their philosophy was very similar to the BV concepts.
2. They had performance metrics.

The authors had the following objectives in studying SBP:

1. Was SBP an expert in the ICT infrastructure and application integration industry in the Netherlands?
2. What are similarities between SBP and the BV approach?
3. Can SBP make improvements using BV concepts?

The BV approach requires an expert vendor. SBP has the following performance metrics that identify them as an expert vendor (See table 11 and 12, figure 5, 6 and 7):

1. They are the top rated ICT vendor in the ICT infrastructure area [in every category measured].
2. They have a project performance of 89.36% on time, 95.74% on budget, and 93.62% customers satisfied on 47 large projects in the last six years.
3. Their performance on large [larger than 150K Euro] projects showed the same performance as smaller projects.
4. Of the six most critical ICT providers that support financial vital infrastructures as stated by DNB (same function as Federal Reserve Bank); they are the only vendor with 100% customer recommendation for outsourcing. (Figure 6).
5. In the last four years, their business process uptime performance is 99.994.
6. Their customer satisfaction rating was 8.9 in 2013 – highest in the IT market for 7 years in a row, 2 full points above the market average [6.9].
7. SBP has 30 expert project managers within the company. Nine out 30 project managers' performance lines are made available for this paper. The average project manager of these 9 have done 5 projects of 150K, with customer satisfaction of 100%, scope of 404K Euros, largest project of 1,402K Euros, a percent cost and time deviation of .68% and 1.33% respectively, and 7.8 years at SBP.
8. Case studies show that although they are perceived as having very high cost, the exact opposite is true. They minimize cost and time for the clients.

Table 11

Schuberg Philis Overall Performance Line

#	Criteria	Metrics
1	Total # of projects in last 10 years	991
2	# of large projects (€150K- € 3.3 Million)	47 (72)
3	% of large projects on time	89.36%
4	% of large projects on budget	95.74%
5	% of large projects customers satisfied	93.62%
6	Highest customer satisfaction 7 years in a row (Market Average)*	8.9 (6.9)
7	Recommended by customers by year	100% 5 years in a row
8	Business Process Availability past 4 years	99.994%

Note: 72 projects existed however; documentation older than 6 years was discarded and not available.
(Giarte, 2014; Schuberg Philis, 2014)

Table 12

Project Manager Performance

	Average of 9 PMs	PM 1	PM 2	PM 3	PM 4
Average size of projects	€ 404,000	€ 264,000	€ 329,000	€ 475,000	€ 328,000
Largest project	€ 1,042,000	€ 764,000	€ 501,000	€ 1,250,000	€ 700,000
# of projects > 150k	5	6	2	5	4
# of years working for SBP	7.8	10	13	7	2
Customer satisfaction	100%	100%	100%	100%	100%
Project cost deviation	0.68%	0%	0%	0%	0%
Project time deviation	1.33%	0%	0%	0%	0%
	PM 5	**PM 6**	**PM 7**	**PM 8**	**PM 9**
Average size of projects	€ 568,000	€ 323,000	€ 350,000	€ 586,000	€ 413,000
Largest project	€ 935,000	€ 556,000	€ 603,000	€ 3,289,000	€ 780,000
# of projects > 150k	3	11	4	7	4
# of years working for SBP	9	8	6	4	12
Customer satisfaction	100%	100%	100%	100%	100%
Project cost deviation	0%	0%	6.1%	0%	0%
Project time deviation	5%	0%	0%	7%	0%

Note: Data retrieved by personal interview by J. van Wegen & A.van Schendel, personal communication, September 17, 2014

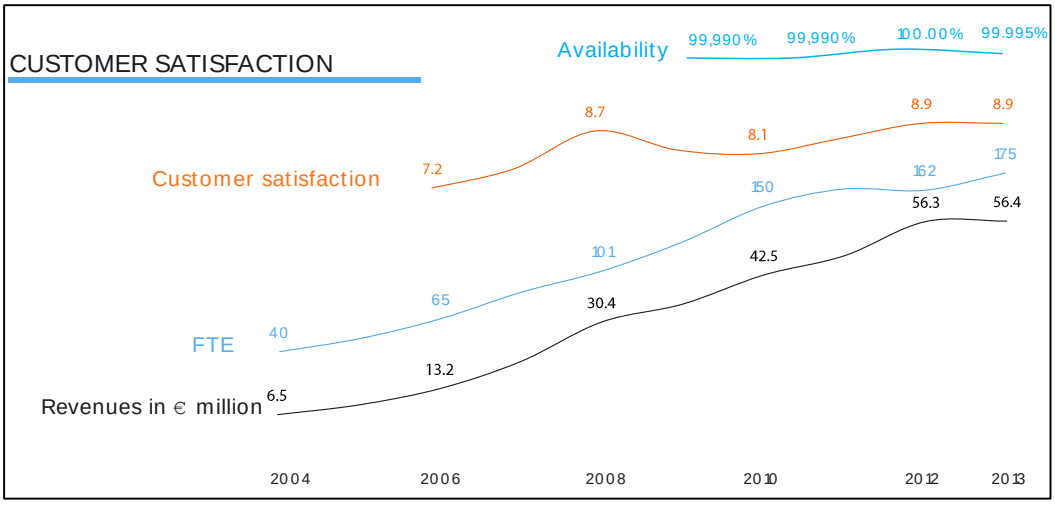

Figure 5: Schuberg Philis Growth and Performance (2014)

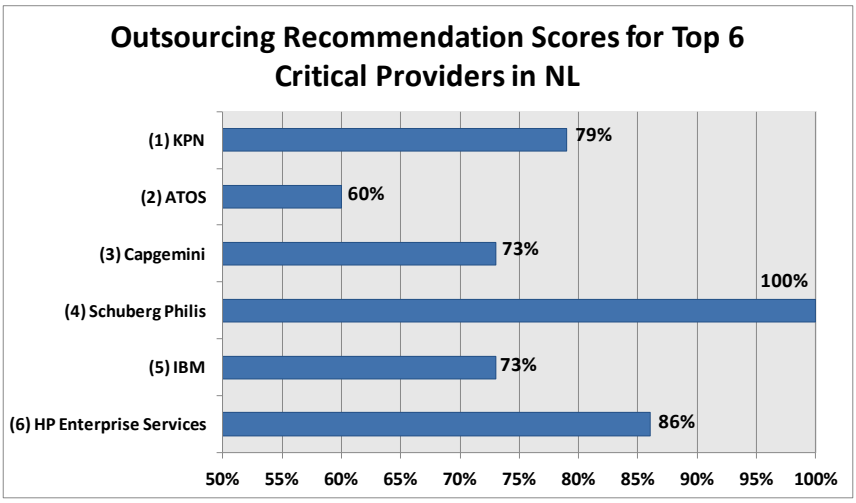

Figure 6: De Nederlandsche Bank Report (Giarte, 2014)

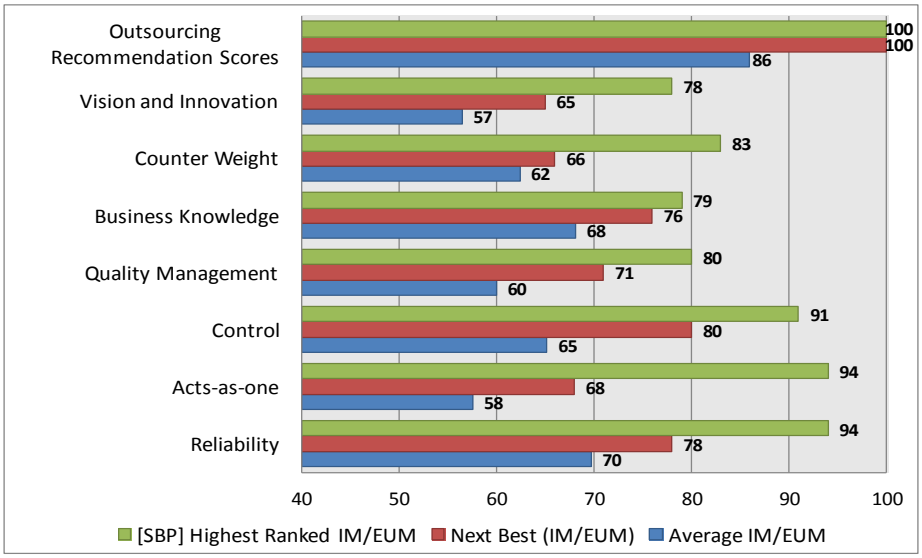

Figure 7: 2014 Giarte Report Results

SBP has a tremendous amount of case studies which shows their ability to minimize the client/owner's ICT implementation time and cost. It is important to note that the SBP project performance metrics have been certified by a certified professional auditor using the audit standards as defined by Norea, the Dutch Branche organization for IT-Auditors (Norea, n.d.). Information on customer satisfaction is acquired from the independent Giarte Report. The following are examples from customer references of SBP:

1. Banking Industry [names and references of banks are available upon request from SBP]: SBP completed 14 bank projects with 0% cost and time overrun, 9.0 customer satisfaction and a delivery time of 6-14 months where the normal delivery time of the market is 24 months or more with a 50% success rate (Table 13).
2. Dutch Federal Government Department [Undisclosed Department]: SBP took over a failed client project which was cancelled after spending 2 years and €15M. SBP proved how the project could be successful in 7 weeks for 200,000 Euros by a Proof of Concept and would be able to reuse 65% of the investments spent on the previously failed project (Table 14).
3. Online Retail Company [name available upon request]: SBP increased their uptime from 96.5% to 99.998%, increased the number of product groups completed each year from 0.5 to 3, and assisted in the CIO receiving the CIO of the year award in 2008 (Table 15).
4. Insurance company [Undisclosed but reference is verified by certified accountant]: SBP increased availability from 98.0% to 99.98% and decreased the client's contingency budget from €800K to €0 (Table 16).
5. Energy Company [name available upon request]: SBP decreased downtime per month from 2.880 minutes to less than 1 minute, improved project on time performance from 50% to 99.6% for the past 450+ projects, and improved the client's TCO from an identical project costing €480,000 in 2006 to earning a profit of €24,000 in 2013 (Table 17).
6. Port Authority Service [name available upon request]: SBP implementation minimized cost per functionality change by 75%,

7. Minimized the application deployment cycle life cycle from 26 to 3 weeks, reduced the downtime in a year from 24 hours to 0 hours, and eliminated a backlog of application related business requirements by 3 years (Table 18).

Table 13

Banking Industry

Performance Criteria	Metrics
Total # of banks	14
*Delivery time (months)	6-14
Cost and time overrun	0%
Customer satisfaction (1-10)	9.0

Note: Normal delivery time in marketplace is > 2 years or 24 months with a 50% success rate

Table 14

Department (ICT Improvement Project)

Performance Criteria	Before SBP	*SBP
Duration of project	2 years	7 weeks
Cost	€ 15.00 Million	€ 0.20 Million
Project results	Failed	100% Success
Customer satisfaction	4	Very high

Note: SBP was able to reuse 65% of spent investments on previously failed client project

Table 15

Online retail

Performance Criteria	Before SBP	SBP
Availability	< 96.5%	99.998%
# of new product groups a year	0.5	3
Compliancy statements (PCI DSS)	NA	Yes
CIO named CIO of the year	No	Yes

Table 16

Insurance Company

Performance Criteria	Before SBP	SBP
Availability	< 98%	99.98%
Compliancy statements (SAS 70/ISAE3402)	N/A	Yearly
# of compliancy findings	Undisclosed	0
Contingency budget for claims	€ 1 Million	€ 0.00

Table 17

Energy Company

Performance Criteria	Before SBP	*SBP
Downtime per month	2.880 minutes	< 1 minute
Cost	Increasing cost	- In 2006: € 480,000 (cost) - In 2011: € 240,000 (cost) - In 2013: € 24,000 (profit)
Project results	50% not on time	450+ projects 99.6% on time
Customer satisfaction	Very low	9.0

Note: The reason Company outsourced to SBP was due to a single deal that lost the company € 1.5 million due to a slow system

Table 18

Port Authority Service

Performance Criteria	Before SBP	SBP
Downtime in a year (hours)	≥24	0
Longest downtime due to IT failure (hours)	4	0
Application deployment life cycle (weeks)	26	3
Cost per functionality change	-	-75%
Business time required related to mediating downtime and incidents	1 full FTE	0
Backlog of application related business requirements	3 years	0
Problems with legal issues / liability claims / reputational damage	Yes	No

The SBP case studies show some characteristics about the ICT industry in the Netherlands:

1. SBP documentation identifies their expertise by minimizing the time and cost required to implement ICT infrastructure. They show by comparison with other ICT services that SBP expertise delivers services for a dominant lower cost, faster time and adding value to business. This is counter to some perceptions that they are high cost or expensive service providers.
2. Their expertise is defined by dominant differences in metrics of project cost and time.
3. Expertise and the utilization of expertise may be the reason SBP has the high customer satisfaction.
4. SBP expertise has been sustainable [10 years, 991 projects, 97% success] and their Best Value approach [discussed later] to business increases their level of expertise.
5. There high performance on both large and small projects shows that the utilization of expertise is a solution to ICT industry complexity issues. It also identifies that the solution of making projects smaller is an indication that the ICT industry may lack expertise. It also identifies the possibility that ICT project complexity is also caused by a lack of expertise.
6. Case studies coupled with high performance over a sustained time period identifies that SBP must have a continuous improvement program in place to be able to produce dominant value over a number of years. High sustained performance has not been identified in many companies in the ICT industry.

SBP is the only company that the authors have confirmed with performance documentation that has multiple major characteristics of a BV operation. The only other company worldwide that has been documented is SEMCO, a pump manufacturer company in South America, whose visionary owner has become famous for the radical approach of observation, alignment and transparency (Stockport 2010). SBP has the following unique BV operational characteristics:

1. They utilize lead experts who are the interface with the prospective clients from the beginning to the end. The traditional approach is to have marketing and sales personnel to interface with prospective clients (See figure 8).
2. They utilize a risk management system that identifies the cost of risk that they cannot control before the project begins to ensure that impact of changes by a client will be understood by the client.
3. Lead project managers volunteer for all potential projects. They must be able to internally within SBP show capability and a successful plan to deliver the potential project before they propose to a prospective client.
4. Lead project managers form teams with voluntary team members.
5. SBP has no function silos. The expert led team takes the project from the design, planning and execution phases to the end of the project (See figure 9).
6. There are no management, direction and control personnel positions at SBP. There is no management layer that manages the project leads. All positions are volunteer positions and team membership must also be voluntary. Any policies must be accepted by the project teams. There are no MDC policies that come from a management group.
7. All personal compensation is based on peer review of the individual.
8. SBP provides total transparency of their costs to the clients.
9. SBP also has internal transparency in their company that is due to the voluntary nature of participation and peer review.

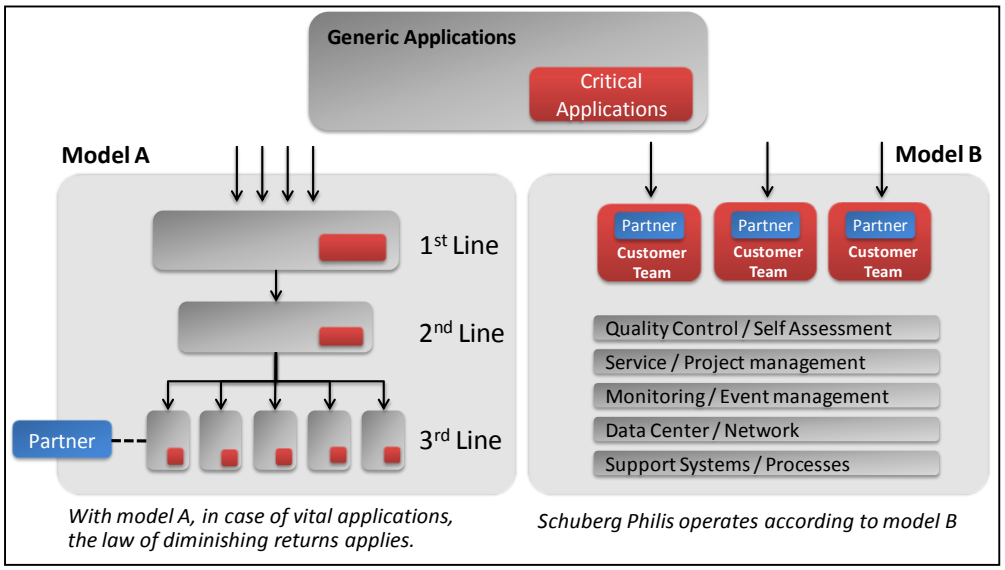

Figure 8: Expert Front Line Client Interface (Schuberg Philis, 2013)

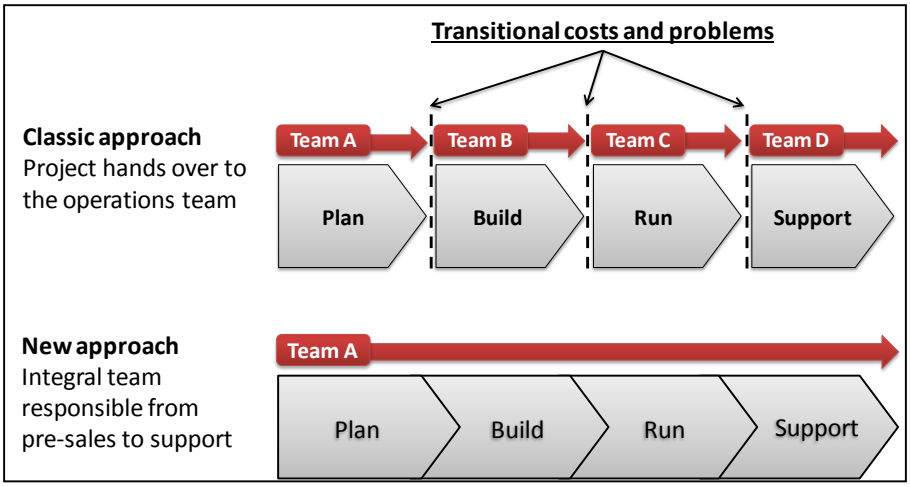

Figure 9: Integrated Project Teams (Schuberg Philis, 2013)

SBP Continuous Improvement and Movement to the Best Value Approach

SBP uses the BV approach to their service. They utilize the following BV concepts:

1. Utilize expertise to minimize transactions.
2. Do not use MDC in their operations.
3. Do not use silo based behavior.
4. Create cost transparency for client.
5. Do risk mitigation.
6. Keep performance metrics to provide transparency.

SBP is a BV organized and high performing expert ICT infrastructure vendor in the Dutch marketplace. Their project performance and customer satisfaction performance numbers show that they are one of the highest performing vendors in the Netherlands. When approached with the BV approach, SBP analyzed their high performance operations and realized that they could become even better by making slight changes in their approach to their operations.

SBP identified that they were currently using an agile project management approach, and as a result the project managers did not always have a detailed project schedule and representative milestone schedule. The project cost and time deviation could not be easily tracked [that would increase the level of internal and external transparency] by both the clients and SBP leaders. SBP leaders also realized that client caused unforeseen cost and time deviations that were being absorbed by SBP to continue to deliver on time and on budget [SBP goals]. They identified that the transparency SBP was providing the clients often led to more client stakeholder participation and requests for more detailed information instead of giving the clients the confidence that SBP was performing on the project and minimizing client/expert transactions. Despite their industry leading performance, the SBP leaders understood the potential value of the subtle paradigm shift from the agile approach to the BV approach.

For the first time in the 22 year history of PBSRG research and development of the BV environment, the authors identified the following:

1. An already highly successful organization was ready to make a subtle but monumental change to go from an expert with a more industry acceptable approach [agile project management] to a futuristic BV approach that no one had previously harnessed.
2. A successful organization's leadership understood the difference between a "price based" transparency that increases MDC transactions and a BV transparency that allows the minimization of MDC and the utilization of expertise.
3. An organization with such a low level of risk [nonperformance] had motivation to change their successful model to become even more successful.
4. SBP had enough Type A or visionary employees that a companywide change/movement could be made to create the level of transparency that performance metrics can provide. This has not been achieved by any vendor in PBSRG's 20 year research of BV environment and supply chain development. Previously, PBSRG advice would be against such a move due to the lower percentage of visionary employees.

The SBP leaders identified that having a BV periodic risk management report (RMR) would create a metric based BV transparency which would allow the clients to have more confidence that their project was on track. The passing of non-technical metrics would allow "non-experts" to understand without getting into the technical details of the project. This would also minimize the client's requests for more detailed project information and minimize the risk of MDC. They also agreed that the metrics could be used internally to quality control the projects using transparency rather than MDC. They have put the RMR system on their company cloud (Schuberg Philis, 2014a). This action will increase the transparency inside and outside of SBP. This action will also create a competitive advantage that will be difficult to challenge and emphasize the importance of expertise and the utilization of expertise.
Having a BV RMR would also motivate the SBP project team leaders and teams to do the following:

1. Identify the project requirement in terms of non-technical metrics at the very beginning of the project.
2. Work the detailed schedule from the end back to the beginning.
3. Use a milestone schedule with time and cost implications to create transparency with the clients.
4. Identify up-front, the potential impact of SBP installed ICT system to the client's business goals.

The biggest change that SBP agreed to do is to document their deliverable from the end to the beginning, identify risk that they do not control, mitigate risk, identify the cost and time deviation caused by risk and simplify their explanation to their clients using non-technical metrics that the client can easily understand. With this information, SBP is also able to create a transparent structure within their company to give potential and current clients access to performance information on Schuberg Philis that was previously not available in the industry on any vendor. SBP has shown the Dutch ICT industry performance can be significantly improved.

They are showing the difference between utilizing the agile project management approach with the vendors who may not be utilizing expertise. SBP has committed to move from an agile PM approach, to a full blown best value (BV) approach. All future SBP projects will be done with the BV approach.

Lessons Learned from SBP Case Study Investigation

The following are preliminary lessons learned from the SBP case study investigation:

1. The ICT industry is price based [relationship based and non-transparent]. Despite SBP high performance, they must still spend significant resources on forming relationships to increase their business.
2. The level of expertise in the industry is low, thus prompting industry personnel to identify the complexity of the projects as the reason for project failure. However, when an expert is identified and expertise is utilized, it is easily identified that the performance on the project is not related to project size or complexity.
3. The ICT industry has not recognized the replacement of MDC with the utilization of expertise as a major solution for solving the industry's performance issues. SBP is a dominant example of the potential of utilizing expertise to resolve industry issues.
4. SBP shows the potential of the BV approach in solving the ICT industry problem of low performance.
5. The level of expertise of ICT vendors may be more dominant than realized by the ICT owner/client industry.
6. The operations of SBP show a potential of using a language of metrics to minimize the owner/client need to MDC expert vendors.
7. MDC based approaches may be the source of problems in the ICT industry. Complexity may be caused by non-experts, by MDC practices and by the bureaucratic organizations and their operational practices.

Further Research

The authors will approach the SBP organization to further document the changes and challenges of the movement from their current operations and environment to a fully transparent and metric based BV environment. The authors see the SBP model as a representation of the potential of the ICT industry and potential changes that the Netherlands is already embracing in other industries.

Analysis of BV Case Study Results

The Arizona State University IT Networking case study, the State of Oklahoma BV history and the State of Oklahoma Tax Software case study, and the SBP case study show the potential of the BV approach [utilizing expertise] to improving ICT industry performance. Each case study shows a dominant improvement in performance. The case studies support the following concepts of the BV approach:

1. The replacement of MDC with the utilization of expertise may be the most needed change required to improve industry performance.
2. The utilization of expertise leads to lower costs, higher performance and value. This is despite some industry perception that expertise is too costly. Then, when faced with massive failure due to the utilization of vendors without adequate expertise, they blame the complexity of the projects.
3. If the expert must be managed, directed and controlled, they are defined as a non-expert and are being hired by a non-expert client.
4. Transparency minimizes the level of complexity and increases the value of experts and their expertise.
5. The price based environment is a MDC environment that increases cost and risk.
6. The relationship based environment of the ICT industry is a price based MDC environment that is non-transparent, complex and increases project cost and risk.
7. The utilization of expertise may increase the success of the traditional waterfall approach, doing smaller projects and utilizing the agile approach to project management.

Comparison of the Three Approaches to the ICT Industry Performance

The waterfall approach is the traditional approach. It utilizes MDC, lacks flexibility, and oftentimes results in poor performance in ICT systems delivery. Simplifying the complexity of an ICT project by making projects smaller, allow the less expert vendors to be more successful. Logic and common sense tells us that this is an accurate concept. The agile approach increases flexibility, simplifies by breaking the project up into manageable components, and increases the teamwork of the client/owner and the vendor. Agile project management should also increase the performance and this is borne out by the results of agile PM by Standish Group and the Schuberg Philis results.

The BV approach stresses utilizing expert vendors [ensuring that an expert vendor is selected], minimizing owner/client MDC, and forcing the expert to use transparency, metrics, and non-technical language to increase the accountability of the expert vendor and motivating the owners to minimize interference in the project. The BV approach has the following advantages:

1. Minimizes the need to MDC expert vendors.
2. Increases the accountability of the expert vendors.
3. Increases the accountability of the client/owners to know their business and how the ICT applications will add to their business goals.
4. Increases the value of the experts and their expertise.
5. Creates transparency which allows everyone to understand the project with minimized information and communications.
6. Increases the strength and performance of the industry to deliver high performance.

Conclusions

The ICT industry [owners/clients and vendors] are struggling with increasing the performance of their industry. Although new solutions have been suggested and implemented, the overall performance and customer satisfaction could be improved. The current environment is one

where the owner/client/buyer of ICT services hires a consultant and manages, directs and controls [MDC] the vendor through a contract. The two major methods of award are low price and a negotiated contract [based on a relationship]. The project is designed and implemented in a "waterfall" approach.
Three potential solutions have been proposed. The first is to make projects smaller, and thus simpler, and the smaller projects would have greater performing results. The assumption is that the projects are too complex. This is logical and simple. It assumes that projects are too large and complex. It also assumes that the industry does not have the expertise to resolve the complexity of large projects.

The Schuberg Philis [SBP] case study results, identifies SBP as an expert vendor who does not agree with the proposal that smaller projects would minimize risk and increase performance. They have done large and small projects, are the #4 critical ICT provider in the Netherlands that support vital IT infrastructures, and the size of their projects has not had impact on the performance of the projects. The third party, performance rating system, which gets feedback of industry clients on all projects in the Netherlands, also disagrees with this assumption. The Giarte reports show that larger projects have received higher satisfaction ratings more often than smaller projects. And smaller vendors show higher performance on smaller projects than larger vendors.

The downside to this concept of making projects smaller and requiring less expertise is that it would become a price based commodity. Owners/clients would have a low price mentality, and the vendors who have less expertise would be encouraged to bid low to get the work. It would penalize those with expertise, and increase our current industry problem of poor performance.

The second solution, the agile project management approach, is a logical solution. The approach breaks up the project into smaller components, utilizes partnering between all stakeholders, and lessons learned can be quickly implemented into the project's other components. The Schuberg Philis case study shows that the agile project management can lead to outstanding performance. The Standish group claims that the agile approach increases performance by 33%. The downside of this approach is that it does not minimize the owner's management, direction and control [MDC] which is a source of project cost and time deviation.

The third solution is the best value [BV] approach. The approach has been tested, modified, and implemented for the past 20 years. It proposes to replace the owner MDC with the utilization of expertise. The best value is the best value for the lowest price. It uses the following concepts:

1. Expert vendors are used to lower costs and improve value.
2. Experts use nontechnical metrics to form transparency.
3. Transparency is used to mitigate risk.
4. Communication between stakeholders is done with a language of metrics.

The difference between the first two approaches and the third approach is that the BV approach utilizes expertise to resolve the complexity, while the other two approaches attack the complexity by reducing the scope by making the project smaller or by breaking a project up into smaller

components and working on a component at a time. Experts in the BV approach work backwards from the well-defined deliverable to the initial conditions, while the other two approaches work from the beginning to the end.

The Schuberg Philis case study is a key to potentially solving the ICT industry performance issue. SBP is an ICT industry expert who has documented their performance. They are very successful using the Agile project management approach. Their case studies and performance metrics confirm their high level of expertise. They show that utilizing expertise resolves the nonperformance issues. Their leadership is interested in becoming even higher performing by adopting the BV structure. Their approach is significant in confirming that vendors with expertise and high performance also have a drive to continuously improve. Their movement from the agile approach to the BV approach shows the potential of the BV approach in the ICT industry. Their expertise and utilization of expertise to perform, shows the importance and potential of expertise and the best value process in raising the level of performance in the ICT industry.

Recommendation

Recommend that further work be done documenting the performance of the SBP company and the increase of performance in moving from the agile project management approach to the BV approach. Recommend also working with the large ITC companies in the Netherlands to study the difficulties they may have in changing from a traditional to a BV organization. Also recommend publishing parts of this paper in other journals concentrating on specific ICT issues. Incorporating the information in this paper in educational programs to users of ICT would also assist the Dutch outsourcing industry.

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