The Development of the Best Value Approach in the State of Minnesota

Dean Kashiwagi (PhD, P.E.), Jacob Kashiwagi (PhD) and Kenneth Sullivan
Arizona State University
Tempe, Arizona, United States

Isaac Kashiwagi (M.S.)
Delft University of Technology
Delft, Netherlands

Owners in the State of Minnesota have a ten-year history of implementing the Best Value (BV) approach utilizing the Performance Information Procurement System (PIPS) with the Performance Based Studies Research Group (PBSRG) at Arizona State University (ASU). The University of Minnesota started testing and implementing in 2005. Other users quickly followed. By 2015, over 400 projects valued at approximately $500M had been delivered using the Best Value process. The results of the BV test projects validated the industry structure analysis concepts and results from another longitudinal study performed by the U.S. Army Medical Command (MEDCOM). The paper also discusses the modifications in the BV approach during the ten-year development. The research conclusions include the following: identified the owner and owner's representatives as the major source of project risk (time and cost deviation); the identification of professional designers as a source of risk; contractors selected by the BV approach was the smallest source of project risk; and a paradigm shift is required to optimize the delivery of construction services. This paper concludes with a case study on a large construction renovation project with the Best Value minimizing project cost by the contractor thinking in the best interest of the client.

Keywords: Best Value, Minnesota, delivery of services, source of risk, minimizing cost

Introduction

The University of Minnesota brought the Performance Based Studies Research Group (PBSRG) and the Best Value Approach to the State of Minnesota in 2005. Michael Perkins, associate vice-president of capital projects and a civil engineer, became interested in the approach a couple of years after Dr. Kashiwagi had presented to some procurement personnel at the University of Minnesota (UM) in 2003.

Perkins realized that the current method utilized by the University of Minnesota was not optimal. His objectives included (Perkins, personal communication, October 14, 2015):

1. Bring the latest approaches and technology in delivering construction to the University.
2. Create efficiency in his own organization.
3. Make the University personnel accountable.
4. Hire performing contractors who would increase value and performance and minimize change orders.

Michael Perkins clearly believed that the traditional process of telling the contractors what to do and awarding to the lowest price was detrimental to the University. This tendency increased cost, caused performance issues, and decreased the accountability of the University's staff.

The State of Minnesota BV tests were preceded by the Federal Aviation Administration Western Region (Goodridge, 2007; Kashiwagi, 2011), State of Hawaii, University of Hawaii and State of Hawaii DOT (waterproofing, roofing, painting and DOT repaving) (Kashiwagi et al., 2001; Kashiwagi et al., 2002) and State of Utah (large vertical construction projects) (Kashiwagi et al., 2002) BV testing. Simultaneously to the State of Minnesota, Harvard University (Kadzis, 2005) and the U.S. Army Medical Command was also (Kashiwagi et al., 2009) testing the BV concepts on procurement, risk and project management. However, the Core of Engineers procurement group out of Huntsville, Alabama ran the BV operation, and continued to clash with the MEDCOM visionary Nathan Chong (Chong, personal communication, August 27, 2015). The effort was more of a test in the shift in the paradigm of traditional project management and led to the term PIRMS or Performance Information Risk Management System.

Up until this time, BV testing by previous research partners had focused primarily on the procurement or selection of the Best Value contractor. Past performance information was the most critical component of the BV system. The name for the Best Value Approach at that time was "Best Value Procurement" (Kashiwagi, 2010). During the selection phase, great care was made to identify risk and the method to mitigate the risk. The vendors were requested to also identify how they were adding value to the project. The interview was key to confirming the high past performance. If the vendor did not perform, their past performance counted up to 50% of their future performance rating. The Best Value Procurement (BVP) system was based on (Kashiwagi, 2011):

1. Vendor past performance database kept by the owner.
2. Dominant high performance capability of the Best Value vendor's key project managers to act like experts.
3. Trust model between the user's project managers and the vendor's project managers.
4. Minimized need for the client/user's representative to have a detailed, definitive scope of work for the vendors.
5. The client announcing their budget to the vendors.
6. No formal cost control for the Best Value vendor. If the vendor showed outstanding performance, they were hired at their requested price.
7. A multi-criteria decision making model (Zeleny's Displaced Ideal Model (DIM) (1982)) was used to identify the value of each piece of information by multiplying the normalized relative value of each vendor's number by the information factor

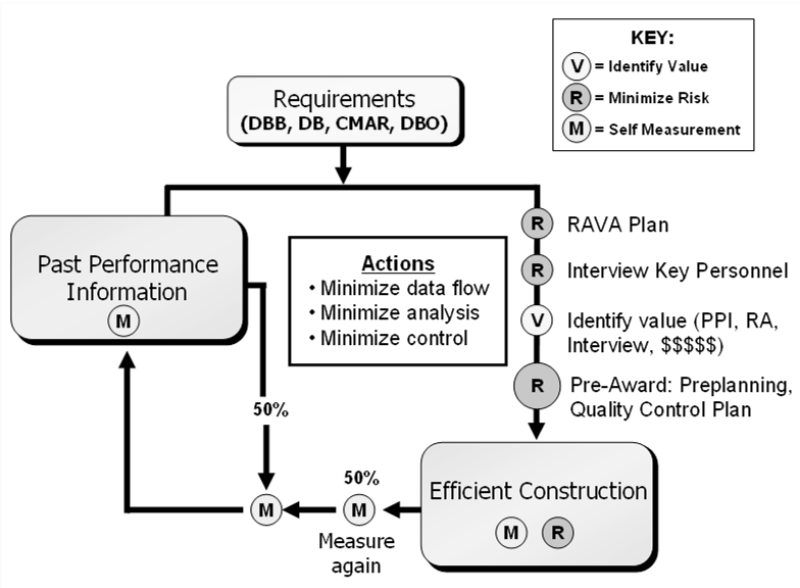

Figure 1: Best Value Procurement Closed Loop System.

Except the large vertical projects at the State of Utah ($50M 2002 Olympic Village construction and a $17M Southern Utah University Recreational Facility), all the other projects had very few detailed drawings and specifications.

Transformation to a "No Trust" BV Approach

The results were dominantly better than anything that had been recorded in the construction industry (98% customer satisfaction, on-time, on budget) (PBSRG, 2015). The early visionaries in the BV testing program realized that there were major flaws in the traditional system to deliver construction:

1. It took too long for the professionals working for the client to design solutions.
2. The professionals were not always the most knowledgeable of construction methods.
3. The expert vendors' (construction contractors) expertise was not being utilized.
4. When the designers identified the scope of the project, their scope was not detailed enough to get competitive bids from experts (did not provide the best quality, minimize change orders and minimize project cost increases and time delays).
5. The low price award was not working on a consistent basis to increase the contractor's quality.
6. The owners could not consistently get contractors to be accountable.

The BV research effort results of the "Best Value Procurement", prior to the State of Minnesota tests, resulted in much higher performance than the traditional delivery systems, but was not totally successful in overcoming some of the major flaws of the industry identified above.

Lessons learned from the project tests before the State of Minnesota (Kashiwagi, 2015b):

1. The Displaced Ideal Model (DIM) which was being used to identify the Best Value contractor was too complex for the construction industry stakeholder and contractors to understand. Industry stakeholders called it a black box which was being controlled by ASU.
2. The greatest risk of the BV approach was political risk. Political risk, and poor performance results, stopped the BV efforts of every visionary BV expert. Political risk was caused by owners' representatives not understanding the value of expert contractors.
3. The majority of the construction industry personnel were reactive and inexperienced.
4. Many project managers who represented owners in the government sector did not understand how to identify high quality. They used subjective minimum standards that required a high degree of management, direction and control from government project managers.
5. Technical people (engineers, project managers) gravitate toward technical details which direct a contractor on how to do work, technical information based on minimum standards and decision making based on the "subjective" minimum standards. Very few technical experts understood how the minimum standards were derived.

It was clear that a paradigm shift needed to be made in the development of the Best Value Approach to minimize these issues. To clearly differentiate the Best Value Approach which addressed these issues, PBSRG and the creator of the Best Value Approach model, renamed the approach with the new name of the Performance Information Procurement System (PIPS) to differentiate it from all other Best Value processes which used the more traditional practices of management, direction and control, but was using the name of the Best Value Procurement process. During the State of Minnesota tests (2005-2015) the Best Value PIPS process was transformed from a procurement centered process to an approach that optimized procurement, project management and risk management (Michael et al., 2008, Kashiwagi, 2015b).

Transformation of BV PIPS Required a Unique Research Approach

PBSRG is a research center based at ASU which does not request or utilize government research funding for its Best Value research ($16M over 20 years). It allowed PBSRG to not have links with existing traditional processes, but to use an entirely different approach to solving problems. PBSRG can immediately identify and test "disruptive" practices without having to coordinate with traditional practitioners. It allowed PBSRG to identify current practices as inaccurate and inefficient. All funding was spent on research testing. If PBSRG could not find research partners who wanted to test the hypothesis, PBSRG would have to shut down its research. Unlike other research centers, it has the following objectives and developments (Rivera, 2014; Kashiwagi, 2015a; Kashiwagi, 2015b; PBSRG, 2015):

1. Use deductive logic, common sense and simplicity to solve industry problems instead of the more traditional inductive approaches.
2. Use mixed methods research focusing on simple solutions based on (commonly acceptable) natural laws and humanistic concepts using case studies, survey results and

results of testing outside of engineering (psychology, psychiatry, education, business and government studies).

3. Proposes the problem of poor construction service performance was not a technical problem but a humanistic problem caused by human beings who are attempting to use detailed technical knowledge and data skills to solve a humanistic and societal problem.
4. Identified that a significant breakthrough in understanding in construction, facilities, project and risk management was the Construction Industry Structure model (changed to Industry Structure (IS) model when it was discovered that the problem was not construction industry specific).
5. Created a new deductive logic based theory called the Information Measurement Theory (IMT) as the foundation of the IS model. IMT identifies that no one can control or influence another human being, that with sufficient information the actions of human beings can be predicted and human beings can only do what they understand. IMT identifies thinking, decision making and managing, directing and controlling (MDC) in any form as the major source of construction nonperformance and project deviations.
6. Identified multi-criteria decision making (MCD) models such as Analytic Hierarchy Process (AHP) and the Displace Ideal Model (DIM) as academic analysis tools only useful within academia. They are useful to help academic researchers understand human decision making, however, would not be suitable for use in test projects done within government procurement. PBSRG identified that these complex mathematics tools will never be sustainable and consistently used by government agencies, private organizations or vendors to select Best Value vendors or individuals. This was dominantly shown in the State of Hawaii tests, where the use of the DIM (the simpler and the easier to explain and use of the MCD models) was a major contention of those fighting against transparency, vendor accountability, performance metrics and fairness. It was identified by industry as a "black box" that was being manipulated by Arizona State University (Kashiwagi, 2011; Kashiwagi, 2014). Research project results identified that public procurement requires transparency which is simple and easy to understand. This is what the authors identify as a natural law (there are no exceptions) that is deductive based on observation during research testing.
7. The only academic research group in construction, project and risk management that utilizes a college honors class (Barrett's Honors Program), high school classes (St. Louis School, Honolulu, Hawaii, Tempe High School, Tempe, AZ), industry experts and families to collect information and validate simple concepts of human nature (requires less thinking and decision making), physical natural laws (such as gravity) and human behavior which were used as the foundation of the construction management research.

The material was so innovative, that the university licensed the BV approach research material as intellectual property. It is the most licensed academic based research technology developed in the construction management area.

PBSRG is the only research center in construction management which has experienced the following (PBSRG, 2015):

1. Continuous funding for 20 years, $16M funding with 1,800 tests delivering $6B of services.
2. Repeated hypothesis testing where the hypothesis are continually modified based on lessons learned.
3. Had research results audited by another university and by a U.S. state legislature (Department of Commerce and Consumer Affairs, 2002, State of Hawaii, 2002).
4. Had a research proposal rejected by the National Science Foundation (NSF) in 2004 for lack of research value and then received funding from Harvard University to run the tests, with the test results at Harvard winning the 2005 Corenet Global Innovation of the Year award. (Kadzis, 2005)
5. Changed a procurement approach of the largest university in the U.S., and delivered $1.7B worth of services with the change, saving the university millions of dollars (Michael et al., 2008).
6. Changed the procurement approach of a country (Netherlands) in seven years, overriding years of traditional concepts taught in the country's universities. Changed the approach of the group NEVI (third largest procurement group in the world) to go from the traditional to accepting the Best Value PIPS approach which changes the paradigm of procurement using IMT and CIS concepts. (Kashiwagi et al., 2013, Van de Rijt et al., 2012)
7. Has performed testing in six different countries and 32 different states in the United States (PBSRG, 2015).

PBSRG is constantly being challenged by younger researchers, or researchers at more traditional construction management schools who are silo based and only accept concepts that are published in peer reviewed journals. These researchers do not have an understanding or knowledge of the BV literature. The BV approach is based on the IMT and IS which has not changed theoretically over the past 20 years. However, the application and implementation has made tremendous strides. The advent of the internet has now created a transparent environment which now places premium value on the speed at which researchers can get their technology to the marketplace. PBSRG has taken the approach that peer reviewed journals are too slow, and too bureaucratic to have any impact on the industry it is trying to help.

Timeline of Best Value Research Clients

The large number of tests (400) over ten years, allowed PBSRG to accomplish what may have been too costly and time consuming if traditional research practices were required. Traditional research is more consensus based; utilizing surveys, statistical analysis and changing processes and systems only after the industry has agreed to the changes. PBSRG, using the IS model, identified that management, direction and control were inefficient and ineffective, and that the utilization of expertise was the only way to minimize project cost and increase value. PBSRG proposed the following to the industry:

1. The owner is the biggest source of risk and cost on the project.
2. The more detailed contracts are, the more inefficient and costly the services will become.
3. The more contracts are used to enforce the project requirements, the higher will be the project cost.

4. When contractors are experts, they have the expertise to have a plan and can do risk management and quality control while tracking project cost and time deviation.
5. Standards are subjective, have no relationship with actual performance, and are very difficult to enforce.
6. The current delivery systems for construction are broken, allowing non-experts to do poor quality work.
7. Contractors and manufacturers are treating the minimum standards as maximums and are driving the delivered performance down as low as they can.
8. Using technical people as construction managers to represent the owner is a broken system that creates confusion and makes all parties reactive to protect their own interests.

All research partners in the State of Minnesota were selected because they accepted these observations and identified them as accurate based on their experience. The research tests tested these observations. There was no need to have discussions and gain a consensus on these concepts. If they did not agree with these concepts, they did not partner with PBSRG to run tests. This approach made the research testing efficient and quick. Many peer reviewers resist the notion that the metrics are valid because of the preponderance of test results. What the traditional research community has to accept is that this is the only research that has been audited multiple times (Duren et al., 2008; State of Hawaii, 2002; Department of Commerce and Consumer Affairs, 2002).

The timeline and major results of the BV testing in the State of Minnesota is presented below (Table 1) along with the significant results of the projects:

- 2004 – University of Minnesota's first contact: Michael Perkins, Associate Vice President of the CPPM of University of Minnesota at that time, attended a Best Value conference at ASU.
- 2005 – University of Minnesota: Michael Perkins decided to pilot the PIPS Best Value program in testing the PIPS structure. The first tests were implemented in the mechanical, electrical and roofing areas of construction. The projects became bigger as time went on, and developed into new capital improvement projects (CIP) (Sullivan et al. Perkins et al. 2007; Sullivan et al., 2008).
- 2007 – BV becomes a law in Minnesota to procure construction. The University of Minnesota was not bound by the state statute, and therefore, was able to implement the BV approach ahead of the change of law. The unions used the PBSRG documentation (13 years of testing) and the University of Minnesota test results to pass the bill. This freed up all other government organizations to test the Best Value model. The only requirement of the law was to be trained in the BV approach, and the number of tests were limited for the first few years. The union legal representatives and lobbyists were interested in getting the Best Value Procurement approved for construction because of the perception of the deterioration of the subcontractor craft capability and their perception that the move would ensure that the training that the unions were doing would maintain its value and market share with signatory (union) contractors.
- 2008 – City of Roseville: The City of Roseville tested BV procurement out on a complex, state of the art, ice rink project. The City of Roseville wanted a "state of the art" power

generation source for their ice rink. They ended up procuring a hydro-electric power generation system that was very efficient. (Smithwick, Sullivan and Kashiwagi, 2014)

- 2009 – City of Rochester: Led by Richard Freese, the city moved from the priced-based system, to the BV PIPS system, procuring large vertical construction projects, professional services, IT systems and DOT projects. (Kashiwagi, 2014)
- 2009 - Olmstead County: Application of one BV project. (Kashiwagi, 2014)
- 2009 - Rochester Public School: Tests of BV PIPS on a school renovation and upgrade project. Used the triple prime concept, then moved to a general contracting approach. Their experiences led to the proposal to either return to triple prime contracting or utilize a mechanical and electrical level of expertise, risk and value added documents. The Rochester School district identified along with other users that the primary source of risk was their nonperforming design work. (Kashiwagi, 2014)
- 2010 Independent School District (ISD) 287 announced the largest test of Best Value in Minnesota (up to this time) with the construction of the North education center in Plymouth, MN. (Rosemeyer, 2013; Smithwick et al., 2013).
- 2010 Rochester Public Utility: Application of BV on construction projects. (Kashiwagi, 2014)
- 2012 City of Roseville Parks and Recreation: Returns to using Best Value on a large park renovation project. (Smithwick et al., 2014)
- 2012 Hennepin County: Implementation of BV PIPS in the Property Services division. (Kashiwagi, 2014)
- 2012 Elk River ISD 728: Implementation of BV PIPS. (Kashiwagi, 2014)
- 2015 City of Rochester: Procures a $55M convention center modification project using the majority of the proposed changes (PBSRG, 2015).

Table 1

Completed Test Projects Performance Metrics

Performance of the State of Minnesota Testing	City of Rochester	City of Roseville	Hennepin County	District 287	Olmsted County	Rochester Public Schools	Rochester Public Utilities	UMN
Total Number of Projects	8	5	9	4	1	39	2	353
Original projects budget (M)	$39.82	$4.94	$28.97	$29.97	$12.36	$38.13	$1.55	$330.69
Average length of project	361	306	254	285	310	206	325	155
Satisfaction score (out of 10)	9.63	9.71	-	8.88	8.75	9.98	8.13	9.50
% Over awarded budget	1.92%	0.79%	0.57%	2.53%	4.43%	4.71%	2.05%	10.50%
% Due to client	0.92%	0.20%	0.14%	0.36%	1.16%	1.26%	0.06%	9.65%
% Due to vendor	-0.05%	0.00%	0.00%	0.00%	-0.21%	-0.08%	0.00%	0.04%
% Delayed	11.71%	5.37%	13.11%	11.01%	12.73%	1.45%	209.05%	46.16%
% Due to client	7.88%	2.89%	2.52%	7.41%	5.45%	0.50%	81.90%	34.69%
% Due to vendor	3.83%	0.00%	0.00%	3.22%	0.00%	0.06%	0.00%	2.33%

Modified BV PIPS Concepts and Practices

The following changes to the BV approach were identified and implemented during the State of Minnesota test (2005-2015) (Kashiwagi, 2014):

1. Eliminated any descriptions of the required scope of work in the RFP submittal from the competing vendors.
2. Introduced a level of expertise criteria that is totally dependent on the vendor to do a specific and unique project of a client.
3. Introduced a dominance check to ensure the selection process has been done correctly and accurately and verifying that the performance metrics submitted by the Best Value vendor are accurate.
4. Introduced the clarification period (project and risk management), where vendors must have a detailed plan from beginning to end, represented by a milestone schedule that is represented by metrics (cost, time, and deliverables), and produce a weekly risk report (WRR) that is a part of their contract).
5. Phased out of the performance information that was used by the clients/owners to track vendor performance and to modify vendor's the performance rating. This was the emphasis of the previous approach.
6. The implementation of a cost control system that minimized the risk of decision making and overpayment.
7. Utilized metrics to create transparency and communicate a contractor's value.
8. Created transparency by going to a system of performance metrics and cost, making the BV PIPS system totally non-technical.
9. Identified that the designers/engineers were the major source of construction cost and time deviations.
10. Also identified the owner's representatives as the largest source of risk who allowed the professionals to continue to increase design cost and construction project risk.

Without the research testing in the State of Minnesota, PBSRG and their industry partners would not have been able to test and improve the BV approach to resolve the traditional challenges of construction nonperformance. The modified BV approach is to minimize:

1. Owner decision making and MDC.
2. The risk of hiring vendors who do not have the expertise required to perform on a project.
3. Confusion that arises with project cost and time deviation.

These changes were made during the past 10 years and are described in case study bullet points below. The validation of these concepts were exhibited in the last project in the State of Minnesota, which is described in the latter part of this paper.

Lessons Learned and Changes in the BV Approach

The biggest challenge in the research was the change of paradigm to move from the owner price based environment to the Best Value environment (see Figure 2). The change was a paradigm shift and not a legal issue. The change of procurement law allowed the government owners to

use the Best Value Approach, however, the paradigm shift was the more difficult to change. To make this move, the owner had to not act as a technical expert and make decisions and MDC the expert vendors. The owner's technical representatives had a difficult time stepping back, forcing the expert vendors to use performance metrics and cost to identify the Best Value vendor. It showed that the clients were using the BV PIPS as a procurement and not a project/risk management approach.

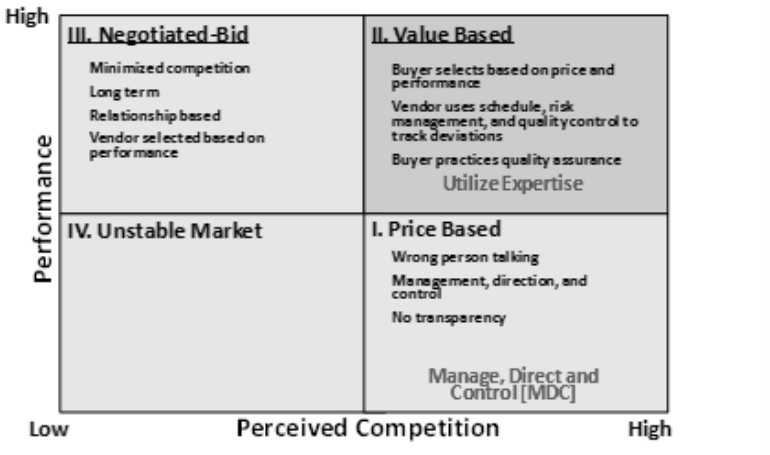

Figure 2: Construction Industry Structure.

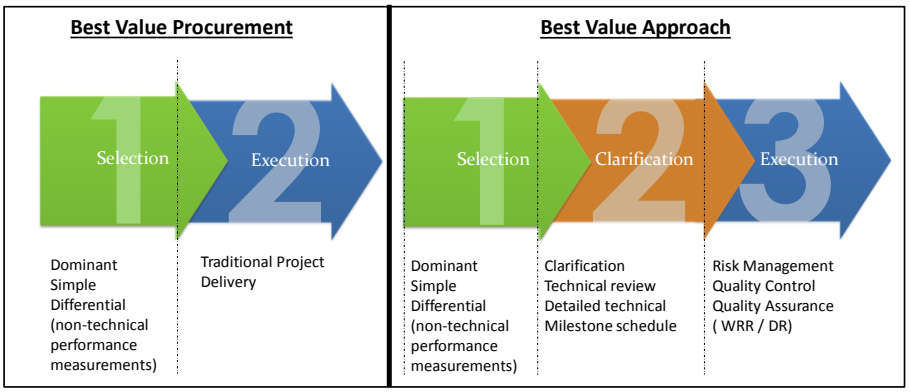

Figure 3: Best Value Procurement to Best Value Approach.

In the last year of testing at the University of Minnesota (UM) (testing lasted for five years), the importance of the clarification period and weekly risk report was realized and implemented. The most difficult task was for the UM visionary Michael Perkins to introduce the change in paradigm after it had been introduced as a BV procurement system. The emphasis changed from the past performance information and database to the importance of using dominant performance metrics which addressed the vendor's level of expertise and capability on a specific project (Figure 3). Only then could a clarification period to create transparency and the implementation of the weekly risk report (WRR) be utilized properly. However, it gave the approach a much better capability on large complex projects. Michael Perkins retired due to a change in administration in 2015 (his job being a political appointed position) (Perkins, 2015). Michael

continues to follow the advancement of the BV approach and attends the annual trainings in Tempe, Arizona.

The UM BV effort was resisted by the professional core of engineers and project managers. When the BV Procurement approach was introduced, the professional engineers went along with the change. It dealt with procurement and was perceived as not affecting their project management. However, when the BV project and risk management approach was implemented, they saw it as a change in their professional job, and resisted.

The City of Rochester was a continuous user of the BV approach. Their use of the process showed the same movement from a procurement system to a project/risk management system that the UM experienced. Their visionary, Richard Freeze, had the main challenges of first, changing his own role from technical to non-technical; second, transforming the effort to get the city to not MDC the vendors through construction managers; and third, minimizing their decision making during the selection, clarification and execution phases.

He also encountered political risks as he had difficulty convincing others in the City of Rochester to understand the advantage of releasing control and utilizing expertise. The city had a practice of hiring a construction manager that did not lead to performing results. Another one of his challenges was the selection of other city personnel who had seemed to have an affinity for the Best Value Approach, but who then reverted to the traditional practices of MDC. He had a very difficult time getting the professional services to understand Best Value. He was one of the main reasons the BV Approach lasted for over ten years in the State of Minnesota.

The next largest user of the BV PIPS approach was School District 287, who ran the $29 million new school construction. The facility manager, Tom Shultz, with the support of PBSRG, utilized BV PIPS and the triple prime approach (hired general contractor, mechanical contractor and electrical contractor as prime contracts). He also hired the technology vendor as a prime. His performance numbers were very high as contractor generated change orders were under 2% and he saved the school district $2.6 million in construction management fees (Rosemeyer, 2013, Smithwick et al., 2013). Table 2 identifies the major metrics in the ISD 287 BV test. He was awarded the FM of the year for IFMA's Minneapolis chapter in 2014 (IFMA Minneapolis/St. Paul Chapter, 2013).

Table 2
ISD 287 School Construction Metrics

Project Name	Value ($M)	Duration (Months)	Schedule Delay %	Budget Deviation %	Client Satisfaction
NEC – General Construction	$25.9	17	0%	2.8%	10.0
NEC – Technology Systems	$1.6	7	32.7%	0.9%	7.6
NEC – Demountable Walls	$2.0	7	0%	0.4%	9.0
TOTAL:	$29.5	11	11%	1.4%	8.9

James Kelly also used the BV approach in combination with Triple Prime contracting (general contractor, mechanical subcontractor, and electrical contractors as prime contractors). His performance is identified in Table 3. James Kelly perceived that the general contractors were bringing nonqualified contractors into the projects. By using Triple Prime, the high performance mechanical and electrical contractors were identifying and mitigating the risk of poor design work. After James retired, the school, due to a lack of construction expertise, returned to the general contractor approach. The results were not as successful due to general contractors hiring low-performing subcontractors or suppliers. The Rochester Independent School District results shed some light on what the sub-trades were stating about the current construction industry structure and the reason for the Triple Prime approach:

1. The most critical components in many vertical construction projects was the mechanical, electrical and the plumbing (MEP).
2. The general contractors' functions were commodity-based and their markups and MDC of the critical MEP contractors was not optimal.
3. They were proposing either to use the very successful MEP in a triple prime approach or to use BV and identify the MEP components as the most critical.

When the Rochester School District went to utilizing general contractors, they did not get the results that the Triple Prime approach produced. This can be attributed to the following:

1. When using a general contractor, the critical subcontractor's risks and risk mitigation were not considered. It diluted the value of the subcontractor's risk identification and mitigation, as general contractors started using subcontractors risk and risk mitigation for other subcontractors. It resulted in the critical subcontractors' expertise and risk mitigation becoming a commodity item.
2. The general contractors were then shopping for the lowest price.

This case study showed why the Triple Prime contracting (TPC) approach was so effective in both the Rochester Independent School District and District 287 projects. Its strengths are utilizing expertise, maximizing the value of the clarification period, minimizing change orders and minimizing the need for the client to MDC.

Table 3
Important Owner-Related Delay Factors

Performance Criteria	**Rating**
Total number of completed and in-progress projects	33
Total awarded cost	$29.6M
Average number of proposals per project	4
Percentage of awards where Best Value was the lowest price	55%
Average Contractor Change Order Rate	0%
Average Contractor Delay Rate	0%
Average Customer Satisfaction Rating (1-10)	9.9
Performance Criteria	Rating

Rochester Convention Center Extension Case Study

Most of the modifications discussed previously were implemented on the last large project run by the City of Rochester to construct its extension to the existing convention center. PBSRG was utilized to assist in running the delivery of the construction services.

The following concepts were not utilized on the procurement due to discomfort with the concept and the PBSRG project manager's or the City of Rochester project management group's:

1. Level of expertise criteria.
2. Adding criteria of sheet metal, air conditioning and plumbing level of expertise, risk assessment and value added.
3. The criteria of electrical level of expertise, risk assessment and value added criteria.

The process was run and Table 4 shows the resulting award matrix. The Best Value vendor was over 5% more in cost, than the next vendor. Table 5 shows the difference in scoring between the two competitors. The owner selected the lowest costing option due to the lack of sufficient information to differentiate between the value of the two competitors and the large difference in cost.

Table 4
Selection summarized scoring Matrix

				RAW DATA				PRIORITIZED DATA			
No	Criteria	Scale	Weights	Vendor A	Vendor B	Vendor C	Vendor D	Vendor A	Vendor B	Vendor C	Vendor D
1	Cost	-	250	$65.61 M	$67.45 M	$67.45 M	$60.39 M	230	224	224	250
2	Risk Assessment	1 - 10	225	8.1	5.4	5.1	8.4	216	133	131	215
3	Value Added	1 - 10	175	8.8	5.8	4.8	8.8	169	109	91	164
4	Interview	1 - 10	350	8.2	5.6	5.2	7.6	350	239	222	324
5	Critical Subcontractors	1 or 0	15	1.0	1.0	1.0	1.0	15	15	15	15
			1015				**Totals**	**981**	**720**	**683**	**968**

Table 5

Best Value Selection Comparison

Criteria and Weights				RAW DATA		PRIORITIZED DATA	
No	Criteria	Scale	Weights	Vendor A	Vendor D	Vendor A	Vendor D
1	Cost	-	250	$65.61 M	$60.39 M	230	250
2	Risk Assessment	1 - 10	225	8.6	8.4	216	215
3	Value Added	1 - 10	175	8.8	8.8	169	164
4	Interview	1 - 10	350	8.2	7.6	350	324
			1,000				
					Price Points	23%	25%
					Performance Points	74%	70%
					Total Points (1,000)	**97%**	**95%**

The Best Value vendor gave the following justification for their lower price:

1. On previous successful projects that were awarded to their company by the City of Rochester, they had very high performance, no contractor generated time or cost change orders and their pricing had been an average of 5% below the average of the other contractors' pricing (PBSRG, 2015).
2. They had no contingency for risk they did not control, minimizing their cost.
3. They used Best Value practices of minimizing any overhead and markup costs of building systems by hiring multiple sub vendors in the key areas.
4. They used different construction methods.
5. They utilized expertise from outside of the local area to minimize cost in key areas. The outside expertise had been previously utilized by their sister company in a different city.
6. Where possible they utilized local expertise to minimize per diem and travel costs.
7. They realized that the most difficult task on the project was the initial coordination and setup of the Best Value structure. They utilized their top project manager and BV expert to setup the system, and once their project/risk management system (utilizing the weekly risk report) was setup during the clarification phase, the BV project manager would not be on the project full time (minimizing his high salary on the project).

PBSRG, working with the different government entities in the State of Minnesota, had previous information on the BV expert project manager being utilized by the Best Value vendor on this project. Research had shown that:

1. The identified project manager on the project had been selected by the vendor after five unsuccessful attempts to gain a Best Value project based on the project manager's affinity to the BV philosophy of transparency, accountability, and utilizing the new concepts of risk management. The vendor team adopted the Best Value Approach and won nearly 80% of all Best Value projects that they proposed on that PBSRG was tracking.

2. The project manager had presented on the Best Value Approach with PBSRG in a different state and was expert enough that some of the attendees questioned if he worked for PBSRG.
3. The vendor had become an expert in transparency, clearly laying out the project in the beginning of the project, and identifying the project risks that they could not control and how they proposed to mitigate the risks. Due to the transparency they did not have project contingency funding for risk that they did not control.
4. They had outstanding performance in the local area of the City of Rochester, with no contractor generated change orders.
5. They were highly accountable to service the client's needs.

This vendor had an advantage over the other vendors because the vendor was already practicing Best Value and not just putting together a Best Value tender. The other vendors were putting together teams of highly rated vendors but were not as good at "thinking in the best interest of the client." In the follow-up with the competing contractors, the Best Value contractor's advantage could be clearly identified in the questions and responses of their competitors.

Conclusion

The Best Value Effort in Minnesota is one of the most significant BV testing in the 20 years of the development of the BV approach (1993-2015). The lessons learned include:

1. The BV approach is not a procurement process. It is a paradigm shift of procurement, project management and risk management.
2. The paradigm shift is for the owner to replace management, direction and control with the utilization of expertise.
3. The BV process is not a trust based system, but one of providing transparency using metrics which assists the owner to understand the project in simple, non-technical terms.
4. The BV expert who is grounded in the Information Measurement Theory (IMT) is indispensable to the owner or to the vendor due to their ability to create transparency and win-win situations.
5. If the visionaries representing the client in the delivery of construction are technically oriented, they will have a great propensity to get confused with technical details, decision making and management, direction and control (MDC).
6. The major source of risk in the delivery of construction is the design and engineering element in which the scope is not accurate and does not utilize the expertise of the contractors.
7. The BV approach to project delivery does not necessarily require a visionary in the owner's organization. It can be created by the vendor's visionary in the clarification period or in a post award clarification meeting that vendors can utilize.
8. The similarity to a boss in an organization micromanaging their personnel, is similar to the owner using MDC in a supply chain delivery of service.
9. Transparency (not MDC) is the way to minimize risk.
10. Transparency is created by the expert in the beginning to minimize confusion and risk caused by stakeholders (who are not expert) during a project.

11. An expert contractor does not have risk. Risk is what an expert does not control. People's misperception of risk is a source of non-transparency and risk.
12. Many owner representatives are uncomfortable with transparency due to the accountability that is inherent in the transparency.
13. The critical trades of mechanical and electrical work are key in minimizing risk in building construction. The Triple Prime contracting approach aligns the expertise to the riskiest areas of construction.

More testing is needed to ensure that the modifications made in the Minnesota testing are effective, efficient and sustainable. Current projects in Canada, Saudi Arabia, the State of Hawaii and in other places across the world are testing these modifications. The researchers propose that more research testing is required and that the new methodology of PBSRG to use deductive logic and actual industry tests is needed to ensure that the industry changes its traditional construction paradigms to increase the performance of the construction industry.

References

Department of Commerce and Consumer Affairs (2002). Hearing Officer's Findings of Fact, Conclussions of law and Decision (2002) State of Hawaii, Office of administrative hearings department of commerce and consumer affairs state of hawaii.

Goodridge, S., Kashiwagi, D., Sullivan, K. and Kashiwagi, J. (2007). The Theoretical Evolution of Best Value Procurement Research, Symposium on Sustainability and Value through Construction Procurement 2006, CIB W092 – Procurement Systems, Digital World Center, Salford, United Kingdom, pp 310- 321 (November 29-December 2, 2006).

IFMA Minneapolis/St. Paul Chapter. (2013, February 1). NEWSLETTER OF THE INTERNATIONAL FACILITIES MANAGEMENT ASSOCIATION - MINNEAPOLIS / SAINT PAUL CHAPTER. Retrieved December 7, 2015, from http://www.msp-ifma.org/wp-content/uploads/2013/03/IFMA_NL_Feb13.pdf.

Kadzis, R. (2005). Harvard University Best Value Procurement System. Retrieved December 7, 2015, from http://www.corenetglobal.org/About/content.cfm?ItemNumber=12860.

Kashiwagi, D. & Mayo, R. (2001) "State of Hawaii Selects 'Best Value' by Artificial Intelligence." Cost Engineering, 43(4), 38-44.

Kashiwagi, D. (2010). Best Value PIPS/PIRMS. Performance Based Studies Research Group, Kashiwagi Solution Model Inc., Mesa, AZ.

Kashiwagi, D. (2011). Case study: Best Value Procurement/performance information procurement system development. Journal for the Advancement of Performance Information & Value, 3(1).

Kashiwagi, D. (2015a). 2015 Information Measurement Theory with the "Kashiwagi Story". Performance Based Studies Research Group, Tempe, AZ.

Kashiwagi, D. (2015b). 2015 Best Value Approach. Performance Based Studies Research Group, Kashiwagi Solution Model Inc., Mesa, AZ.

Kashiwagi, D., & Byfield, R. (2002). State of Utah performance information procurement system tests. Journal of construction engineering and management, 128(4), 338-347.

Kashiwagi, D., & Kashiwagi, J. (2013). Dutch Best Value Effort. In RICS COBRA Conference (pp. 356-363).

Kashiwagi, D., Savicky, J., & Kashiwagi, A. (2002, April). Analysis of the Performance of 'Best Value'Procurement in the State of Hawaii. In ASC Proceedings of the 38th Annual Conference, Virginia Polytechnic Institute and State University–Blacksburg, Virginia (pp. 373-380).

Kashiwagi, D.T. (2014) Best Value Standard, Kashiwagi Solution Model, Mesa, AZ.

Kashiwagi, J., Sullivan, K. and Kashiwagi, D. (2009) Risk Management System Implemented at the US Army Medical Command, Vol. 7 No.3, 2009 pp. 224-245.

Michael, J., Sullivan, K. and Kashiwagi, D.T. (2008) "Leadership Based Project Management Model Tested on Food Services at Arizona State University" 4th Scientific Conference on Project Management (SCPM) & 1st International Project Management Association (IPMA) / Mediterranean Network (MedNet) Conference on PM Advances, Training & Certification in the Mediterranean, Chios Island, Greece, pp.234-238 (May 29, 2008).

Performace Based Studies Research Group (2015). Performance Metrics. Unpublished raw data.
Rivera, A. (2014). Impact of a Non-Traditional Research Approach Case Study on the Performance Based Studies Research Group (PBSRG) (ARIZONA STATE UNIVERSITY).

Rosemeyer, B. (2013, February 14). District 287 wins construction honors for NEC. Retrieved December 7, 2015, from http://sailor.mnsun.com/2013/02/14/district-287-wins-construction-honors-for-nec-2/

Smithwick, J., Schultz, T., Sullivan, K., & Kashiwagi, D. (2013). A model for the Creation of Shared Assumptions and Effective Preplanning. International Journal of Facility Management, 4(3).

Smithwick, J., Sullivan, K., & Kashiwagi, D. (2014). Utilization of a Best Value Structure on a City's Park Renewal and Upgrade Program. Journal for the Advancement of Performance Information & Value, 5(1).

State of Hawaii (2002) Report for Senate Concurrent Resolution No. 39 Requesting a Review of the Performance Information Procurement System (PIPS) (Nov, 2002). State of Hawaii, PIPS Advisory Committee.

Sullivan, K. and Savicky, J. and Kashiwagi, D. and Perkins, M. and Grussing, J. (2007) Transitioning to an Information Environment: Performance Research in Large Capital Projects and Facility Management Group. Fourth International Conference on Construction in the 21st Century (CITC-IV): Accelerating Innovation in Engineering, Management, and Technology, Gold Coast, Australia, CD Track 21 (July 11-13, 2007).

Sullivan, K., Savicky, J., & Kashiwagi, D. (2008). Case study of sustainability of the PIPS Best Value program at the University of Minnesota. Journal for the Advancement of Performance Information & Value, 1(1).

Van de Rijt, J., & Santema, S. (2012). The Best Value Approach in the Netherlands: A reflection on past, present and future. Journal for the Advancement of Performance Information & Value, 4(2).

Zeleny, M. (1982). Multiple Criteria Decision Making. New York: McGraw Hill.