Impact of a Non-Traditional Research Approach

Case Study on the Performance Based Studies Research Group (PBSRG)

by

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ABSTRACT

Construction Management research has not been successful in changing the practices of the construction industry. The method of receiving grants and the peer review paper system that academics rely on to achieve promotion, does not align to academic researchers becoming experts who can bring change to industry practices. Poor construction industry performance has been documented for the past 25 years in the international construction management field. However, after 25 years of billions of dollars of research investment, the solution remains elusive. Research has shown that very few researchers have a hypothesis, run cycles of research tests in the industry, and result in changing industry practices.

The most impactful research identified in this thesis, has led to conclusions that pre-planning is critical, hiring contractors who have expertise will result in better performance, and risk is mitigated when the supply chain partners work together and expertise is utilized at the beginning of projects.

The problems with construction non-performance have persisted. Legal contract issues have become more important. Traditional research approaches have not identified the severity and the source of construction non-performance. The problem seems to be as complex as ever. The construction industry practices and the academic research community remain in silos. This research proposes that the problem may be in the traditional construction management research structure and methodology. The research

has identified a unique non-traditional research program that has documented over 1700 industry tests, which has resulted in a decrease in client management by up to 79%, contractors adding value by up to 38%, increased customer satisfaction by up to 140%, reduced change order rates as low as -0.6%, and decreased cost of services by up to 31%.

The purpose of this thesis is to document the performance of the non-traditional research program around the above identified results. The documentation of such an effort will shed more light on what is required for a sustainable, industry impacting, and academic expert based research program.

DEDICATION

I would like to dedicate this thesis to my future self, Dr. Alfredo Rivera. I want to remind myself the journey is long, but the payoff is priceless. I have spent an enormous amount of time and effort on this research, but I dare not deceive myself; the effort is not the value added, but the change I was able to make along the way that enabled me to see a little clearer and become a little more efficient for the benefit of those around me in every area of my life. The most difficult part in the pursuit of bettering oneself is the growing pains one must take upon them self, in order to perceive a new level of understanding. Often the change may not appear worth the dreadful eye-opening truth, but I find as one continues along their path of those higher pursuits, the pain is less and the payoff much greater. Dr. Rivera, no matter where you are at in life when you read this dedication, remember, accepting who you are is the hardest and most painful truth of them all, but it will reap the most benefits.

ACKNOWLEDGMENTS

Growing up, I never thought I would be given such an honorable privilege to work beside such an amazing group of people that would take me under their wing and incubate me, as I am given a second opportunity to grow and develop into a professional. What my time working as a research assistant has taught me is a professional is not one that boasts about their level of intelligence or the number of post-nominal letters placed after one's name, but the humility that it takes to understand what value everyone around you has, and to listen and utilize whatever expertise they possess.

One of the greatest lessons I have learned in my research is to stop and take a step back when I am stressed and blind, and think about why I am doing what I am doing, for whom I am doing it for, and what value can I add to those who will give my work their attention. I have realized, even the greats understand they could never achieve any feats, without the collected efforts of many. My hope in life as I continue to grow and learn is to never forget that I am not alone, and all the expertise I need to help me achieve my greatest feats are already in front of me.

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INTRODUCTION

1.1 Introduction

Construction Management research has not been successful in changing the practices of the construction industry. The method of receiving grants and the peer review paper system that academics rely on to achieve promotion, does not align to academic researchers becoming experts who can bring change to industry practices. Poor construction industry performance has been documented for the past 25 years in the international construction management field (Latham, 1994; Egan, 1998; Lee, et al., 1999, Horman, M. & Kenley, R. 2005; Egbu, 2008). However, after 25 years of billions of dollars of research investment, the solution remains elusive. Research has shown that very few researchers have a hypothesis, run cycles of research tests in the industry, and result in changing industry practices [Kashiwagi, et al., 2008b; Strategic Direction, 2005]. The most impactful research has led to conclusions that pre-planning is critical, hiring contractors who have expertise will result in better performance, and risk is mitigated when the supply chain partners work together and expertise is utilized at the beginning of projects (Kashiwagi, et al. 2012a; Ang. G 2011, Rijt, and Witteveen, 2011, Santema, S. 2011, Wearden and Graeme 2008).

1.2 Problem

The problems with construction non-performance have persisted. Legal contract issues have become more important (Odeh, and Battaineh, 2002; Zaghloui, and Hartman, 2003;

Kashiwagi, et al., 2009c). Traditional research approaches have not identified the severity and the source of construction non-performance. The problem seems to be as complex as ever. The construction industry practices and the academic research community remain in silos. This research proposes that the problem may be in the traditional construction management research structure and methodology. The research has identified a unique non-traditional research program that uses an alternative approach, referred to interchangeably in this paper as the best value (BV) approach, with the following differences in the assumptions and requirements of research structure and methodology (Kashiwagi, et al. 2008b; PBSRG 2014):

- The industry does not understand the source of their own problem.
- Emphasis must be on logic, hypothesis, and test results.
- The solution is not a technical solution.
- The research expert must be creative, innovative, a visionary leader, and work outside of the construction industry to find the solution.
- The research expert must be focused on becoming an expert over 10 to 20 years.
- The researcher must use deductive logic [case study] instead of inductive logic.
- The researcher must override negative peer reviews.
- The researcher must create a new research structure that is sustainable.
- The researcher’s performance, researcher’s results, research structure and the researcher’s publications must be simple, easy to understand, and implementable by the industry.
- The researcher must have repeated research tests and consistent results.

1.3 Purpose of Thesis

This thesis focuses on a research program that has many of the above characteristics. The purpose of this paper is to document the performance of the non-traditional research program around the above identified points. The documentation of such an effort will shed more light on what is required for a sustainable, industry impacting, and academic expert based research program.

1.4 Research Questions

To ensure the results of this research are accurate and understandable, questions have been formulated to help better define the objectives of this research. Therefore, the discovered answers to the questions will be the researcher's contribution to the exposure of the non-traditional research approach’s structure i.e. the components required for a sustainable, industry impacting, and academic expert based research program.

The main research question is formulated as follows:

What characteristics of the non-traditional research approach (NTRA) that are different from the traditional research approach (TRA), help improve the performance and value of the traditional research approach, and identify the problem of non-performance in industry?

The main research question is sub-divided by the following sub-research questions:

1. What characteristics of the NTRA are different from the TRA?
2. Can the NTRA that is centered around “academic expertise” have impact on the industry and be sustainable?
3. How does the NTRA have an impact on industry and academia?
4. Can the NTRA, which is attempting to change the industry and academia, overcome resistance?

1.5 Methodology

To discover the answers to each of the sub-research questions, different research methods have been utilized. The methodology for this research was modified from Dul and Hak’s (Dul and Hak, 2008) structure for theory building and theory testing. The major research techniques that are used are as follows:

1. Literature Research
2. Case Study Research

The purpose of the literature research is to find “candidate propositions for testing” (Dul and Hak, 2008), which will be used to answer sub-question 1. The case study research will assist in answering sub-questions 2-4.

Methodology steps are the following:

1. Conduct literature research to identify performance in the construction industry.
2. Identify characteristics of both the traditional and non-traditional research approaches through an analysis of the literature research.
    a. Furthermore, identify the major differences found in both approaches.
3. Conduct case study research on the NTRA, and identify if the NTRA can have impact in industry and academia.
4. Identify how the NTRA created impact in industry and academia, and if it can overcome resistances, and become sustainable through an analysis of the case study research.

1.5.1 Literature Research

A literature review was conducted to identify non-performance in industry and the characteristics that both the NTRA and TRA have used in attempt to bring change and innovation to industry needs. The literature review focused on both construction and non-construction industries, since the NTRA has been used in multiple industries. The sources used to obtain the research were from books, academic journals, conference papers, websites, organizational documents, and publications, proposed by Dul and Hak (2008).

The purpose of the literature research is to identify characteristics in the NTRA that are different from the TRA. The method used for the literature research can be found at the beginning of Chapter 2.

1.5.2 Case Study Research

To validate if the NTRA characteristics, identified in the literature search, have impacted industry and academia, a case study research was performed. The case study was on a non-traditional research group, which has documented case study tests performed with different public and private organizations on projects in both construction and non-construction fields. The case studies documented performance measurements that identified if impact and value was increased on projects. The method used for the case study research can be found at the beginning of Chapter 3.

1.5.3 Research Deliverables

Through answering the research questions, this research aids in the exposure of the non-traditional research approach, by identifying alternative, industry impacting characteristics, for research institutions attempting to close the gap between what researches are finding and what industry is performing.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature research performed on construction performance, and the characteristics of both the traditional and non-traditional research approaches.

2.2 Literature Research Methodology

The author performed a literature research that includes the following steps:

- A search for construction performance information and research approaches.
- Identifying research characteristics of traditional research approaches.
- Identifying research characteristics of non-traditional research approaches.
- Analysis between the NTRA characteristics and the TRA characteristics.
- Analysis of large reputable research institutions such as the National Science Foundation (NSF) and the Construction Industry Institute (CII).
- Four main search engines were used: EI Complex, Emerald Journals, ABI/Inform, and Google Scholar.
- Each search engine has thousands of scholarly journals and millions of articles.
- Main keywords for database searching were: construction supply chain management, project management, procurement, risk management, and research group structures.
- The author sifted through over 300 abstracts and identified over 30 relevant articles, 3 books, and 4 websites to further investigate.

The purpose of this literature research is to answer sub-question 1 (Chapter 1): What characteristics of the NTRA are different from the TRA? The literature research was primarily focused on the construction industry. The following sections will identify what was discovered from each literature research step.

2.3 State of the Construction Industry

The construction industry, historically, has had problems with delivering services or projects on time, on budget, with high customer satisfaction. A breakthrough study was conducted in 1994 by Sir Michael Latham (1994), who identified how significant non-performance, was attributing to the continued failings within construction in the United Kingdom. He was one of the first researchers to expose construction non-performance has been existent for the past 30 years. Latham identified current business practices of management, direction and control as the proponents of an inefficient environment, and non-performance on construction projects (1994). Due to Sir Latham’s efforts, many industry and academics were moved, and attempted in the mid 1990’s to resolve these issues (Kashiwagi, et al. 2008b).

Due to the continuous efforts of resolving construction non-performance, the industry was still not improving. In 1997, the United Kingdom commissioned John Egan to develop a task force to perform another study on the performance of the industry. Similar to the first study, Egan identified a lack of leadership in business practices and integration of standard processes and teams (Egan, 1998). Although both studies conducted have motivated industry and academia to help non-performance, the construction industry has seen minimal improvements moving into the 2000's to present day (Chikuni & Hendrik, 2012; Oyedele et al., 2012; Georgy et al., 2005; Bernstein, 2003).

According to the 2011 Key Performance Indicators (KPI) from the United Kingdom, the construction industry has improved from 2000 to 2011 in certain areas, but suffered in others (UK Report 2011; Kashiwagi, 2013):

- Overall customer satisfaction increased from 63% to 80%.
- Customer satisfaction for projects over 5M Euros was at 73%.
- Projects completing on time increased from 28% to 45%.
- Projects completing on budget increased 50% to 63%.
- Contractor profitability declined to 5% from 7% in 2010.

Studies have also been conducted in the United States showing similar results of non-performance (Kashiwagi, 2013):

- Productivity has decreased by .8% annually (Adrian, 2001).
- Construction companies have the second highest failure and bankruptcy rate of 95% (Associated General Contractors, 2006).
- Over 90% of transportation construction jobs are over budget (Lepatner, 2007).
- Almost 50% of time is wasted on job site (Lepatner, 2007).

2.4 Traditional Research Approach

Since the landmark study conducted in the early 1990's by Sir Michael Latham, construction management academics have been under pressure to resolve construction non-performance, but have only identified and published overtime the current states of the industry, with no real understanding of the problem or how to resolve it (Kashiwagi, et al. 2008b). Although the construction industry has improved over the last 25 years, it still has significantly more room to improve by up to 65% in some cases, and it is difficult to identify what has been the attributing factor for slight improvement over the years.

Traditional construction management research has had difficulty with developing and advancing innovative solutions toward industry that have impact; this may be due to its current structure and funding model (Impact Analysis, 2004; Kashiwagi, and Kashiwagi, 2011a-b; PBSRG, 2014). This can be seen by such cases like one of the largest research efforts in Malaysia from 2001 – 2009, between the Construction Industry Development Board (CIDB) and the Construction Research Institute of Malaysia (CREAM), which proved to be more problem-some then helpful. During the eight years of research and development, research funding totaled $18.9M, incorporated 39 individual research efforts, and produced little to no implementable construction research (Kashiwagi, and Kashiwagi, 2011a-b).

In 2013, the United States higher education institutions received research and development grants totaling $65.8B (NSF 2014). The National Science Foundation alone spent $5.2M for higher education research and development, with the engineering fields receiving up to $2M. The Department of Defense spent $4.9M, with the engineering fields receiving up to $2.4M. The academic research community has little shortage of accessible funding; though heavily funded, the traditional research approach has yet to make large innovative contributions that impact the construction industry (Latham, 1994; Egan, 1998; Lee, et al., 1999, Horman, M. & Kenley, R. 2005; Egbu, 2008; PBSRG, 2014). The traditional construction research model has had the following characteristics over the last 25 years (CII 2014; Egbu, 2008; Kashiwagi, et al. 2008b; Kashiwagi, 2013; Kashiwagi, 2014; PBSRG, 2014) [See Appendix E]:

- Major source of funding is grants.
- Grantee agencies often have their own research areas.
- Research often focuses on construction technical skills, and not on industry structure, inefficiency, and ineffectiveness of client's delivery system, and use of performance measurements.
- Often, researchers have to identify research areas being requested, submit lengthy competitive proposals, wait for approval, and then conduct research in awarded area.
- Researchers may become reactive.
- Researchers are pressured to become experts in one area of funding.
- If funding source changes interests, researcher must change to meet demand.

- It is difficult to develop expertise in one area [10+ years], if area of interest changes too soon.
- Researchers must continually compete for grants.
- Research findings are usually studies/reports that document current practices that may propose new models/practices, with difficulty implementing research findings.
- Successful researchers may experience resistance from struggling researchers, due to successful research putting pressure on non-performing research.
- Relationship based; researchers often collaborate and partner amongst themselves.
- Research is often complex and uses inductive logic.
- Graduate students are the often the mainstay of research, while professor focuses on teaching.
- Research areas are in silos, and only often focus entirely on the construction industry [contractors and construction].
- Goal of research is often driven by academic promotion.
- Over time there has been a use of different terminology/definitions, but no significant change in results [Stuart Green, Reading University].
- Very few significant academic research theoretical contributions that bring change to the construction industry.
- Often, the majority of research dissertations are survey based from expert's opinions, and not test based on actual case study results.
- Little to no repeat testing, to test significant hypothesis.

2.5 Non-traditional Research Approach

Although, the traditional construction management research efforts have attempted to resolve non-performance in industry for the past 25 years, only a few delivery systems developed in the last decade have performance documentation showing an increase in customer satisfaction and value (schedule, budget, flexibility, and quality) on construction and non-construction projects (Egbu, 2008; Kashiwagi, 2013; PBSRG, 2014).

In 2006, the International Council for Research and Innovations in Building and Construction (CIB), one of the largest global organizations that bring international and government research institutes to collaborate on the building sector, sanctioned Task Group 61, to investigate construction performance, with an objective to stimulate global research efforts from its findings, to improve construction overall on a global scale.

In 2008, Task Group 61 [later elevated to a working commission called W117 at the end of 2008] conducted a worldwide study to identify any innovative construction methods that used performance measurements as a means to increase project performance. The study filtered through 15 million articles, and reviewed over 4,500 articles. Out of the 4,500 articles, it found 16 articles that identified three construction methods being used that showed how customer satisfaction and value on projects, were improved through numerous tests.

The Performance Assessment Scoring System (PASS), and the City of Fort Worth Equipment Services Department (ESD – FT), two out of the three systems and after further investigation, were found to either have performance measurements with no identification of its structure and how well it worked, or could not show exactly how it improved project performance through performance measurements (Egbu, 2008; Kashiwagi, 2013; PBSRG, 2014) [See Appendix E].

The final system the CIB Task Group identified was a delivery/risk management system called Performance Information Procurement System / Performance Information Risk Management System (PIPS/PIRMS), developed by an international research group out of the Del E Webb School of Construction at Arizona State University (See Appendix E). This was the only system that had documented performance of industry impact and added value, and how it was structured to implement the advancements it found during test cases in industry (See Appendix E). What is unique about the research group's model was its initial investigation that identified the traditional research approach as non-performing. To mitigate the risk it identified in the traditional approach, it shifted toward a non-traditional research approach in the early 1990's, which created an efficient structure to prototype test its model in industry and identify impact. The non-traditional research model has the following characteristics (Kashiwagi, et al., 2008b):

- Primary source of funding is from research clients/test partners.
- Professor/researcher is the mainstay of research and worldwide expert, instead of graduate students.

- Use research funding to minimize academic administrative duties [research is integrated into all professor's duties].
- Funding is sole source, due to professor's expertise.
- Research is considered consulting and discovery at the same time.
- Research collaboration with other researcher's research is minimized.
- Research area is larger than area of traditional expertise [construction].
- Goal is to increase expertise and not academic promotion.
- Merge teaching with academic expertise; offer students both learning and accurate and latest industry practices.
- Only conduct research in area of expertise.
- Use deductive logic [case studies].
- Seek simplification instead of complexity.
- Must generate pipeline of students to learn expertise to continue the research effort [cannot use other program's students].

2.6 NTRA and TRA Differences

After the literature research, the author identified six major characteristics related to both approaches:

1. Research approach
2. Funding model
3. Development of expertise
4. Theoretical contributions

5. Academic status
6. Industry implementable research

The author first looked at the research approaches and identified two major approaches: inductive and deductive. The research approach's significance is it sets the research operations and the order of the five remaining characteristics. The difference between the deductive and inductive approaches can be seen in Figure 1 below.

Inductive Logic	Deductive Logic
• Exploratory	• Observation
• Quantitative methodology	• Qualitative and Quantitative
• Requires large amount of data	• Implement logic with case study
• Exceptions	• No exceptions
• Stepwise improvement	• Radical change
• Slow process requiring time	• Quicker prototype testing and implementation

Figure 1: Inductive and Deductive Approaches

Inductive logic can be defined as analyzing data collected from many sources, and developing a series of hypotheses (Dudovskiy, 2014; Kashiwagi, 2014). Inductive logic is only focused on generating theories and not necessarily proving anything. The approach is not trying to prove if premises are true, rather provide enough probable support that it may be true. Often, this approach to research is lengthy and segregated (see Figure 2), due to the necessary steps of gathering data, analyzing the data, attempting to create a model for testing, then going out to test the model. Often, before the model makes it to testing, the data changes and many modifications are required. One portion of this methodology cannot move forward without completing the preceding step.

Deductive logic can be defined as developing a hypothesis based on an understanding of natural laws, and then designing a research strategy to test the hypothesis (Dudovskiy, 2014; Kashiwagi, 2014). Deductive logic is only focused on proving whether a theory is true. This approach uses logic to understand and define what is true, and is only looking for exceptions to natural laws and widely accepted principles. Because it is logic based, its conclusions are faster and confirmatory (see Figure 2), due to using what is already observable and provable. This methodology allows for overlap between each step of research, and performs efficiently and effectively.

The NTRA has the following logical characteristics (Kashiwagi, 2014):

- No new information is included in the explanation.
- The existing information is used.
- No exploratory research or experimentation is required.
- Faster, simpler, and more economical than inductive research and scientific method.
- Requires less technical or specialized information, not understood by average person.
- More dominant than inductive logic.
- Uses dominant information.

Dominant information has the following characteristics (Kashiwagi, 2014):

- In the form of metrics.
- Shows differences [benchmarks of performance lines].
- It is simple.
- It is easily verifiable and quantifiable.
- It does not require any expertise.
- Brings consensus.
- It is observable.

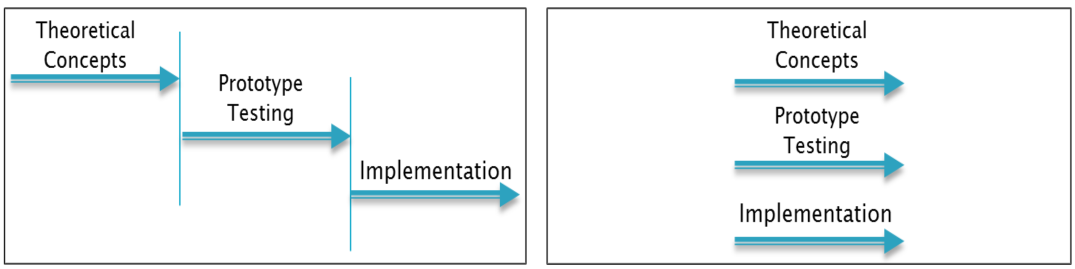

Figure 2: TRA and NTRA Research Models A

In Figure 2, each portion of research is broken up into three main categories: theoretical development, testing, and implementation. In the TRA the theoretical development encompasses the entire inductive logic approach as seen in Figure 1, whereas all three of the NTRA's main categories encompass the entire deductive logic approach at the same time. Due to the deductive logic approach, the NTRA can cycle through development and testing faster than the TRA, which ultimately leads to industry impact and quicker implementation of theoretical developments seen in Figure 3 (Kashiwagi, et al., 2006; Kashiwagi, et al., 2008b).

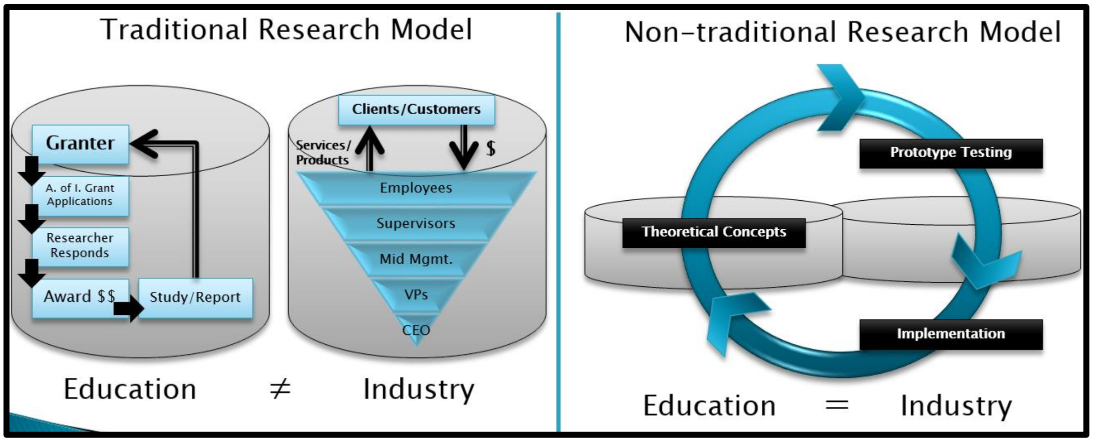

Figure 3: TRA and NTRA Research Models B

Some of the major observations discovered regarding the differences between the two approaches are seen in Figure 3 (Impact Analysis, 2004; Kashiwagi, et al., 2006; Kashiwagi, et al., 2008b; Dudovskiy, 2014):

- Traditional research model (TRM) and industry are in separate silos, whereas the Non-traditional research model (NTRM) has integrated both silos.
- TRM's structure does not focus on conducting research based on industry needs, rather it is focused on a research inquiry from large granter's such as National Science Foundation and Construction Industry Institute. The NTRM only conducts research based on industry needs, and partners with clients that are open to prototype testing.
- TRM's major source of funding is through granter's, whereas the NTRM's major source of funding is through research clients.
- Granters often have their own research areas of interest, whereas industry only has a need to be resolved.

- Researchers in the TRM compete for grants through lengthy and tedious proposals, whereas researchers in the NTRM have no competition, due its sole source technology.
- When a TRM researcher is awarded a grant, they often conduct studies on current industry performance, then produce a report that is submitted to the granter. Often these studies are not implemented in industry (Egbu, 2008). When a NTRM is awarded a grant, they run prototype tests of the theoretical development immediately, and publish results. Often, the NTRM theoretical developments are implemented in industry.
- TRM does not provide researcher security to develop expertise [10+ years] in one area, due to continual competitive grant proposals, whereas the NTRM grants revolve around the same concepts for testing.
- Due to silos in the TRM, researcher's motivation to perform research is often not based on resolving industry non-performance, but achieve academic promotion. The NTRM does not operate in a silo, due to its funding model, which is only developing expertise by consistently refining the model (see details of NTRM in Chapter 3).

2.7 Literature Review Conclusion

In conclusion, the six major characteristics outlined in Figures 1-3, reflect two different approaches for conducting research as it pertains to sustainability, impacting industry by reducing non-performance and developing an expert academic research program. The next step in this research is to identify the NTRA's development and impact in industry.

Chapter 3

CASE STUDY: NON-TRADITIONAL RESEARCH GROUP

3.1 Introduction

The previous chapter identified from a literature research, the major characteristics that both the TRA and NTRA differed. This chapter will review the case study research performed on the non-traditional research group, the Performance Based Studies Research Group (PBSRG), in the Del E Webb School of Construction (DEWSC) at Arizona State University (ASU). The author will identify how the research group was formed, its performance line over two decades, and the four major components that has led it to develop a sustainable, industry impacting, and academic expert based research program.

3.2 Case Study Methodology

The author approached the singular case study on the non-traditional research group with five main objectives (See Appendix E for all below objectives):

1. Document entire history of the non-traditional research group PBSRG.
2. Document all major research clients and efforts.
3. Document all major research group case studies and lessons learned.
4. Document all theoretical developments and advancements of NTRA.
5. Document performance of NTRA, since its creation in the early 1990s.
6. Looked at over 200 articles, 3 books, 10 websites, and interviewed key personnel in PBSRG.

7. The author identified 6 major efforts and 22 case studies to further investigate.

The purpose of this case study research is to answer sub-questions 2-4 (Chapter 1):

- Can the NTRA that is centered around "academic expertise" have impact on the industry and be sustainable?
- How does the NTRA have an impact on industry and academia?
- Can the NTRA, which is attempting to change the industry and academia, overcome resistance?

3.3 Performance Based Studies Research Group (PBSRG)

The non-traditional research group in the DEWSC at ASU is the sole source of the NTRA. From the NTRA, PBSRG developed the Performance Information Procurement System (PIPS)/Performance Information Risk Management System (PIRMS) [business models], the Information Measurement Theory [logical model], and are leading experts in project delivery/risk management and leadership techniques (Rivera, 2013; Kashiwagi, 2013). The systems have been developed by Dr. Dean Kashiwagi from Arizona State University, to both effectively identify and select high performance, and provide a new project/risk management model for vendors/contractors, in both construction and non-construction industries. The systems were initiated in 1991, as part of Dr. Dean Kashiwagi's dissertation (1991). The research group has been in operation since 1993, serving both construction and non-construction industries. The first test of the process was performed in 1994, to identify roofing systems and contractors for private companies (Kashiwagi & Savicky 2002a-c), to running PIPS/PIRMS tests on an over 1B euros infrastructure project in the Netherlands in 2009, to changing state procurement laws in Minnesota (See Appendix E). The NTRA's model developments have been very successful over the last two decades, and has evolved from strictly a selection process to additional functionalities of project/risk management that encompass the entire supply chain from a projects' or services' inception to the maintenance of it after the projects' or services' completion (Rivera, 2013; Kashiwagi, 2014).

What has caused PBSRG to thrive in its approach to resolving non-performance in industry, has been its ability too only focus on solving real industry needs and issues as they come up. The research group has shifted from working with any research client that has a need or issue, to only conducting research with those who are willing to listen to the research group and implement the research results. As stated earlier in section 2.6, it was the deductive logic approach of understanding non-performance in industry, which eventually led to the preliminary observations in section 3.4. Those observations became the foundational principles PBSRG conducted its research.

3.4 Perception of the Construction Industry

Due to a reactive environment with the traditional research approach at the Del E Webb School of Construction at Arizona State University in the early 1990's, Dr. Dean Kashiwagi, founder of the non-traditional research group, developed a new research approach [See Appendix E]. Dr. Dean wanted to continue the development of his industry prototype project delivery/risk management model (now known as

PIPS/PIRMS), and his understanding reality model Information Measurement Theory (IMT) [explanation of why and how things happen and are the way they are], which he believed would solve the construction and non-construction non-performance issues. After research investigation, the preliminary observations of the construction industry in late 80's and early 90's, became the fundamental assumptions/concepts and understanding that underlies the foundation of the NTRA, and helped in the formation of both theoretical developments: PIPS/PIRMS and IMT. The fundamental assumptions/concepts and understanding of the NTRA are the following (Kashiwagi, et al., 2008b, Kashiwagi, 2013; Kashiwagi, 2014):

- The construction industry is broken.
- Existing research does not understand industry structure, and is not focused on right issue.
- Owners/buyers were using management, direction, and control (MDC) of expert vendors/contractors.
- When MDC was utilized:
  - Minimum standards are used.
  - Vendors become reactive.
  - Experts become less competitive.
  - Non-experts direct experts.
  - Blind or non-transparent environments allow non-experts vendors to compete.
- Any practice utilizing MDC will not improve performance.

- Traditional MDC practices are being taught in universities and practiced in industry.
- Must use test cases to expose real issues and advance construction project performance.
- Everyone is wrong regardless of his or her position, until proven otherwise through results of testing.
- The majority of the industry including academia is blind [cannot accurately identify and resolve non-performance].

3.5 Non-traditional Funding Model

In the early 1990's when numerous construction research groups were established to research and resolve construction non-performance, the PBSRG identified the constraints of the traditional research approach's funding model would inhibit its ability to conduct deductive logic research [case study based]. PBSRG's funding model later lead to its understanding of the industry structure and how to increase the efficiency and effectiveness of construction and non-construction project performance by replacing the traditional business approach of management, direction, and control, with the utilization of expertise. The non-traditional funding model has the following characteristics (Kashiwagi, et al., 2006; Kashiwagi, et al., 2008b; PBSRG, 2014):

- Propose a solution upfront for industry non-performance.
- Only work with test partners/research clients who will use the research group's proposed solution.

- Ensure test partners understand solution.
- Developed a filter (Information Measurement Theory), to identify client's level of understanding.
- Work only with research partners who will run tests, implement change, and analyze test results.
- Work with the entire supply chain, not just the construction industry.
- All research grants are sole source: if research clients do not identify the research group's expertise, they lack the capability to understand and will have difficulty releasing control and implementing research results.
- Use General Patton's military approach: do not contest with those who oppose the non-traditional model; run tests with those who are willing and publish results to for those who originally had trouble seeing its value, and reflect what is possible for those seeking such innovation (D'Este, 1996).
- PBSRG identified five major areas to seek operational funding:
    - Construction clients that were not receiving high performance.
    - High performance contractors/manufacturers, who wanted to gain a competitive advantage of their high performance.
    - High performing industry participants, who were naturally efficient and wanted to add value to others.
    - Unions, training groups, safety groups, who wanted to see change and help the industry become better trained.
    - Professional groups seeking change and continuous improvement.

With over twenty years of testing the model and modifying it due to lessons learned and advancements, the technical steps and process have been altered, but the assumptions/concepts and understanding that creates the foundation of the system has not changed (Kashiwagi, 2013).

3.6 PBSRG Performance Metrics

The author started the study on the non-traditional research approach by documenting its impact in the professional industry over the last twenty years. The following metrics and documentation shows the level of acceptance and success of the research approach in industry and academia (Rivera, 2013; Kashiwagi 2014; PBSRG 2014) [See Appendix E]:

- Founded in 1993 [21 years of operation].
- 1700+ projects and services delivered (construction and non-construction).
- $6.3B of projects and services delivered.
- 98% customer satisfaction.
- 9.0/10 client rating of process.
- $15.9M in research funding generated.
- 57% of the time, the NTRA models selected the highest performing expert for services that is the lowest cost.
- Decreased the cost of services on average by 31%.
- Contractors/vendors were able to offer the client/owner 38% more value.
- Decreased client efforts by up to 79%.
- Change order rates were reduced to as low as -0.6%.

- 123 Unique clients [both government and private sector].
- 12 National/International Awards
- 38 Arizona State University licenses.
- 400+ papers published.
- 140+ Classes taught [research expertise].
- 10 New courses developed.
- 3700+ total number of students taught.
- 4.7 overall instructor average.
- 4.6 overall course average.
- International recognition/implementation [Canada, Netherlands, Botswana, Malaysia, Australia, Democratic Republic of Congo, France].
- Largest projects: $100M City of Peoria Wastewater Treatment DB project (2007); $53M Olympic Village/University of Utah Housing Project (2001); $1B Infrastructure project in Netherlands (2009);
- ASU's case study results (Michael, J., Sullivan, K. & Kashiwagi, D. 2008).
    - Saved $110M/year using non-traditional research approach.
    - Food Services contract [John Riley and Ray Jensen].
        - ASU received $32 million.
    - Sports marketing contract [estimated $80 million over 10 years].
    - ASU IT networking [saved $2.5 million/year]
        - Customer Satisfaction Rating (out of 4.0)
            - Faculty/Researchers- 3.8

        - IT Departments- 4.0
        - Average- 3.81

- Changed entire project management/procurement service industry in the Netherlands (Rijt, J., Santema, S. 2012):
    - 15 projects completed [expected was 10].
    - Procurement costs and time were reduced by 50% by both the government and the competing contractors.
    - Projects finished 25% faster.
    - Contractors and Rijkswaterstaat [infrastructure ministry] were very pleased with the results.
    - Rijkswaterstaat won the most prestigious procurement award in the Netherlands, the 2012 Dutch Sourcing Award.
    - NEVI [Dutch Professional Procurement Group] is licensing BV PIPS technology and certifying in the Netherlands.

The above performance metrics were collected from over 30 published articles. The researcher also found that an academic university group from the Netherlands and the State of Hawaii performed audits verifying many of the above metrics (State of Hawaii PIPS Advisory Committee 2002, Duren JV & Doree A 2008). Due to the dominant information identifying the impact the non-traditional research approach has had in industry and academia, the research reflects that this research approach has been accepted by professionals and students, and has been successful in improving performance of the industry and academia in many different services (Rivera, 2013).

In 2013, PBSRG sanctioned a follow on worldwide study to the CIB worldwide study in 2008 by Task Group 61. The study's objective was to identify all efforts [research or industry] around the world that are similar to the non-traditional research model, as well as the current construction performance. The study sifted through hundreds of papers, websites, and personal industry contacts, and did not find any organization in the world that is currently approaching research or business similarly to the non-traditional research group at Arizona State University. According to this study, the construction industry has had the following results (Thomas, and Napolitan, 1995; Odeh, and Battaineh, 2002; Hsieh et al., 2004; Assaf, and Al-Hejji, 2006; Arain, and Pheng, 2006; Lo et al., 2006; Sambasivan, and Soon, 2007; Al-Kharashi, and Skitmore, 2009; Mahamid, et al., 2011; PBSRG, 2014):

- Industry and research operate in silos.
- Industry is predominantly run by a win-lose low bid/price based environment.
- Industry's business approach predominantly practices the client managing, directing, and controlling the expert vendor/contractor and not utilizing their expertise.
- Low performance is still plaguing the construction industry.
- Schedule delays have been up to 98%.
- Budgets have been over by up to 75%.

3.7 PBSRG's Four Major Components

In this section, the author will outline the major components of the NTRA, what is significant about each component, and how they all relate. The understanding of each component, was accomplished by first creating a historical timeline [See Appendices] of the research group, and identifying major patterns and components. The author identified four major components that work in unison to accomplish the simultaneous discovery and consulting effect described in the characteristics of the NTRA (see section 2.5). The four major components of the non-traditional research group are:

1. Research testing and analysis (R&A)
2. Professional organizations (Prof. Orgs.)
3. Publications and documentation (PUB)
4. Education (EDU)

In the following sections, each component will be introduced, followed by a discussion for each component that will follow the identified format:

- Introduction – Description of component and its purpose.
- Implementing NTRA characteristics – Identification of the significance and/or changes made to the NTRA.
- NTRA characteristic conclusion and results – Lessons learned from implementing NTRA characteristics, how the component relates to the others, and performance measurements.

3.7.1 NTRA Component I: Research Testing and Analysis (R&A)

3.7.1.1 Introduction

The main purpose of the (R&A) component, stated in section 2.6, is the research approach sets the operations of the entire research group or effort. PBSRG identified in the early 90's that it must develop a product and solution for industry that works, and is continually improving. For this reason, the following operations became apparent:

1. Focus only on solving real industry needs and issues.
2. Must implement problem solution model in industry to identify impact, and have continual model improvement through new advancements and research developments.
3. Must continually work with industry, in order to stay abreast with current needs and issues, as well as have continual improvement opportunities for the evolving the model.

In part, the success of the new models developed from the NTRA was due to the continual cycle of improvement over that last two decades. The initial understanding and use of the new model developments were primarily focused on collecting past performance information, which only differentiated between low and high performance vendors using a complex selection model. After 15 years to the present, through continuous testing and improvement, it has shifted toward identifying experts and utilizing their expertise, to develop and clarify their plan, and how they will complete a project or service with no technical risk, little transactions, and perform it on time and on budget.

3.7.1.2 Implementing NTRA characteristics

Over two decades the NTRA's research models have evolved through five major research stages and research steps [See Appendix E]:

1. Phase I – (1993 – 1998) Documenting Past Performance Information [Industry Structure].
2. Phase II – (1999 – 2004) NTRA Testing on New/Large Construction Projects [Management, Direction, and Control versus PIPS/PIRMS].
3. Phase III – (2005 – 2008) NTRA Testing on Non-construction Projects [Information Measurement Theory].
4. Phase IV – (2008 – 2011) PIPS/PIRMS Maturation.
5. Phase V – (2011 – Present) Education Paradigm.

Each stage represents a logical progression of altering the NTRA models, through continual testing and implementing the foundational principles in both industry and academia. For each phase below, see Appendix E for details.

Phase I – Documenting Past Performance Information [Industry Structure]

From 1993 – 1998, the non-traditional research group:

- Partnered and conducted NTRA prototype testing with 23 research clients/donors.

- Conducted $1.8M of services in expertise.
- Tested on the following major research clients
    - Federal Aviation Administration (FAA)
    - Job Order Contracting (JOC)
    - Local roofing and facilities management organizations.
    - Neogard
    - United Airlines
- Focused on collecting past performance information from roofing and facilities maintenance contractors.
- Developed a complex procurement model.
- Primary research was to better differentiate between high and low performing contractors.

The following observations were documented during the NTRA's implementation:

- The industry structure is not well defined or understood by the traditional research approach.
- The industry does not understand the source of their own problem.
- The solution is not a technical solution, but a supply chain solution.
- The research expert must be creative, innovative, a visionary leader, and work outside of the construction industry to find the solution.
- The researcher must use deductive logic [case study] instead of inductive logic [data analysis].

- The researcher's solution must be simple, easy to understand, and implementable by industry.
- Without a logical model to understand people's actions and predict future outcomes, it becomes difficult for traditional researchers to identify why non-performance remains in industry.

The NTRA had the following major developments and advancements:

- Developed industry structure definition of construction environment.
- Developed first version of PIPS/PIRMS, which identified high performance based on a contractor's price and performance.
- Used past performance to identify expert roofing and facilities management contractors.
- Displaced ideal model (DIM) was first mechanism to prioritize contractors on their performance.
- NTRA was able to identify intelligent owner, who bought value and utilized expertise.
- First questioned level of importance of past performance information.

The NTRA had the following lessons learned:

- Decision-making increases transactions.

- Vendors would not use the NTRA for continuous improvement, due to a misunderstanding that the system was designed to identify the problem and provide next steps to improve.

Phase II – NTRA Testing on New/Large Construction Projects [Management, Direction, and Control versus PIPS/PIRMS]

From 1999 – 2004, the non-traditional research group:

- Partnered and conducted NTRA prototype testing with 26 research clients/donors.
- Conducted $3M of services in expertise.
- Tested on the following major research clients:
    - Dallas Independent School District
    - Netherlands
    - State of Utah
    - State of Georgia
    - State of Hawaii
- Ran new/large construction testing of the NTRA models, for the first time.

The following observations were documented during the NTRA's implementation:

- The non-traditional research group was completely new to large/new construction projects.
- The research group's experts had no expertise in large construction projects.

- The research group used the deductive logic approach to solve the industry's needs and issues.
- Many traditional personnel in positions of power were not in favor of developing a transparent environment.
- Identified DIM procurement model needed to be revised and simplified.

The NTRA had the following major developments and advancements:

- Identified the major difference between low performance and high performance in industry is low performance practices the approach of the client using MDC over the expert vendors, whereas the high performance uses the approach of the client stepping out of the way and allowing the vendor to utilize their expertise to complete projects and resolve risk.
- The NTRA began testing on large and/or new multimillion-dollar construction projects, from small roofing and facilities management projects.
- NTRA was primarily viewed as a procurement model to select high performing contractors.
- NTRA only focused on selecting contractors based on expertise [performance and price].
- NTRA identified higher performers do not always have higher cost.
- The risk management portion of the NTRA was the most important component of PIPS/PIRMS.

- Posting of all performance online was critical to establishing a transparent environment.
- PIPS/PIRMS is a system that can cause low performers to become high performers without changing the capability of the people.
- Alignment of high performers with an NTRA environment will increase the production by 100%.

The NTRA had the following lessons learned:

- The DIM was ceased, due to its complexity and lack of understanding from contractors.
- DIM was replaced with a simple linear matrix model.
- Shifting toward simplicity made the procurement department's job easier, toward the selection of expert contractors.
- Many government sectors become antagonistic against the NTRA.
- The best value contractor should provide the lowest cost, or identify dominant reasons why he or she was not.
- Despite unwarranted modifications of the NTRA, it will still produce higher performance than the low-bid system.

Phase III – NTRA Testing on Non-construction Projects [Information Measurement Theory (IMT)]

From 2005 – 2008, the non-traditional research group:

- Partnered and conducted NTRA prototype testing with 46 research clients/donors.
- Conducted $2.8M of services in expertise.
- Tested on the following major research clients.
    - Arizona Parks
    - Arizona State University
    - Baptist Health South Florida System
    - City of Peoria
    - Entergy
    - Netherlands
    - Raytheon Missile Systems
    - Schering Plough
    - State of Minnesota
    - U.S. Army Medical Command
    - U.S. Army Corps of Engineers
    - University of New Mexico
- Identified every industry has the same problem [focus on technical expertise, and not the supply chain structure from procurement, through project management, and maintenance of a completed project or service].

- Identified the IMT education was critical for clients to understand people's actions and how to predict future outcomes.
- The sustainability of the NTRA's implementation within a client's company relied heavily upon the internal team's understanding of the IMT.

The following observations were documented during the NTRA's implementation:

- The non-traditional research group was completely new to non-construction projects/services.
- The research group's experts had no expertise in non-construction projects/services.
- The construction and non-construction industries have the same issue of client's using management, direction, and control over expert vendors/contractors.
- Experts in the construction industry operate similarly in the non-construction industry.
- Experts can see a project or service from beginning to end, and articulate a simple plan upfront before a project or service begins, which identifies what, when, and how they will accomplish their job, and identify risk and mitigate/manage it.

The NTRA had the following major developments and advancements:

- Realized the problem in industry was non-technical and required a logical model (Information Measurement Theory), which explained why everything happens including action of people [IMT is used to predict future outcomes].

- Began testing the NTRA on non-construction projects, and not just the former projects that were within the area of the research group's traditional expertise.
- Changed the procurement system of an owner from low bid to best value, which only focused on identifying experts.
- The selection of high performance focused on the procurement structure and not the technical expertise of the contractor.
- NTRA changed its focus toward proper structure of all procurement systems, and not only construction systems.
- Created the risk management portion of the PIPS to stand alone as PIRMS.
- The best value contractor was identified as the best value for the lowest cost.
- Identified the NTRA is the best mechanism for selecting high performers.
- The NTRA can identify and define the detailed delivery of services of a final product for the client.
- The PIPS/PIRMS model was simplified and its clarification period was defined.
- The NTRA is sustainable for high performers.
- Education of a core team is critical to successful implementation.

The NTRA had the following lessons learned:

- MDC of clients makes it difficult for vendors to measure performance.
- Negotiations only result in increased decision-making.
- High performing contractors must use dominant information to stop client decision-making.

- Countries that do not have enough visionaries will not have the ability to sustain or make the paradigm shift toward the NTRA.
- Use performance metrics in bid submittals that can be verified.
- Contracts have no leverage over poor performers.
- Political risk is the most dangerous risk to the NTRA.

Phase IV – PIPS/PIRMS Maturation

From 2008 – 2011, the non-traditional research group:

- Partnered and conducted NTRA prototype testing with 43 research clients/donors.
- Conducted $3.7M of services in expertise.
- Tested on the following major research clients:
    - Arizona State University
    - General Services Administration
    - State of Minnesota
    - State of Oklahoma
    - State of Utah
    - Western States Contracting Alliance
    - University of Botswana
- Refined and simplified PIPS/PIRMS.
- Began testing on large construction and non-construction projects outside the United States.

The following observations were documented during the NTRA's implementation:

- PIPS/PIRMS is no longer in a major role of development.
- Non-traditional research group is now focused on the education and assisting high performance vendors and other supply chain participants who have the capability to implement the NTRA system.
- The ability to understand and implement the NTRA is a capability.
- When a client cannot release control of the project, the quality decreases.

The NTRA had the following major developments and advancements:

- Fully defined the NTRA's process/structure and environment.
- PIPS/PIRMS matured and only experiences minor adjustments.
- Focus of the NTRA shifted from an emphasis on the procurement model, toward changing the project management model.
- The focus of the project management model was on project management and the clarifying of a project or service upfront before a contract is signed. Ensured all risks the expert vendor did not control, had a detailed plan regarding the minimization and management of those risks.
- Identified transparency through dominant metrics will increase accountability.
- NTRA minimizes protests.
- NTRA enables smaller vendors to compete and perform work.
- Clients can identify high performers without technical expertise.
- The NTRA can be tested and successfully implemented in other countries.

The NTRA had the following lessons learned:

- Transfer of risk is disruptive, due to vendors being reactive and depending on traditional approach of client using MDC.
- Vendors require assistance to learn how to be proactive and minimize risk they do not control.
- The interview portion of the procurement model, should be shortened.
- Vendors are capable of measuring and documenting their performance.
- Education of IMT/PIPS is very important in service industries.
- Client's technical personnel may bring the greatest risk to the delivery of a project or service.
- Employees work in silos, and their main goal is survivability, and systems like the NTRA is a threat to employees in large organizations.

Phase V – Education Paradigm

From 2011 - Present, the non-traditional research group:

- Partnered and conducted prototype testing with 43 research clients/donors.
- Conducted $4M of services in expertise.
- Was observed with the following education streams:
    - K-12/Higher Education
    - University of Malaysia
    - Saudi Arabia & Indian Effort
- Identified new structure for succession plan.

- Now focused on merging teaching with academic expertise; offer students both learning and accurate and latest industry practices.
- Identify and establish the NTRA with willing education groups both national and international.
- Due to maturity of PIPS/PIRMS, PBSRG is now focused on using case study research from students who learn and understand the new paradigm, to help support the change in industry toward the NTRA.

The following observations were documented during the NTRA's implementation:

- It is difficult to implement the NTRA research education in other academic universities, both national and international.
- Academic implementation of the NTRA requires a stable professor and core management group, who are willing to learn and implement education for at least five years.
- Foreign students are a platform for NTRA research education insertion within home countries.

The NTRA had the following major developments and advancements:

- Identified a mechanism centered around education to make the change in industry easier.
- Changing the industry paradigm by using and "education model" to increase capability of industry experts [most industry experts are blind or non-expert].

- Change paradigm of traditional thinking.
- Help industry understand to change paradigms, IMT education is required.
- Use education results to support model for paradigm change in industry.
- Educate industry with new mentoring model to assist "the blind to see" without MDC.
- Teach people how to think more simply, and come to conclusions five times faster [speed up paradigm change].

The NTRA had the following lessons learned:

- Successful understanding of IMT, requires a core team of five, who will be with organization for at least five years.
- Countries that do not have visionaries will have difficulty implementing the NTRA.
- Transparency will increase accountability, and causes bureaucratic countries and industries to resist the NTRA.
- People who learn and apply IMT earlier in life have a higher success rate of understanding it.

3.7.1.3 NTRA Characteristics Conclusion and Results

The NTRA characteristics were tested with 123 unique research clients, 6 countries, 31 United States, on over 1700 projects, with over 50 unique services in two decades. Although, not every research client gravitated toward the new paradigm, the PBSRG has been able to develop from its initial observations in 1990, to an internationally renowned supply-chain management model that covers the breadth of any project or service from inception to maintenance after the project or service is complete.

Due to the operation model of staying abreast with industry needs and issues, the NTRA models have gone through continuous cycles of improvement, which has taken nearly two decades too fully develop models that can solve non-performance in industry. The models evolved from misunderstanding what part of the models were most critical for resolving industry non-performance [documenting contractors performance, using a complex procurement model to differentiate between high and low performers]; to fully understanding non-performance is due to a lack of utilizing expertise, and removing the illusion of control, by letting the expert develop a risk management plan that illustrates their plan to accomplish projects or services more efficiently and effectively. Throughout the five major research stages and steps over the last two decades, the NTRA had the following results:

- Could be used in any industry [construction or non-construction].
- Identified the industry problem of non-performance is not due to a lack of technical "know how," but an active approach toward replacing MDC with the utilization of expertise.
- Shifted away from complexity and data collection and analysis, toward simplicity and the use of deductive logic [natural laws and case studies], to understand reality.

- Accurately identify expertise based on both performance and price.
- Created a transparent environment that has increased the efficiency and effectiveness of industry performance by up to 40%.
- Reduced management transactions by up to 79%.
- Increased additional value by up to 30%.
- Increased customer satisfaction by up to 140%.
- Reduced project change order rates as low as -.6%.
- Saved up to 31% of project costs.

3.7.2 NTRA Component II: Professional Organizations (Prof. Orgs.)

3.7.2.1 Introduction

The main purpose of the (Prof. Orgs.)competent is to connect industry with research. The (Prof. Orgs.) component was the primary method that PBSRG connected with industry and met visionary leaders in their fields who understood the importance of the NTRA's proposal, and test for impact within their own organizations. In the previous section, it identified why the research operations were set, whereas this section will cover the major part of how the research operations were fulfilled. The characteristics of the (Prof. Orgs.) component were the following (See Appendix E):

- Main source of meeting research clients/donors.
- Identify companies [public or private] or professional organizations that wanted to partner with PBSRG as a research client/donor.

- Focus on presenting no less than 20 times per year through industry and academic conferences, both national and international.
- Use conferences as a platform for exposure of concepts and gain potential research clients.
- Work with potential research clients/donors who will listen to research group, run NTRA tests, and implement results.
- Continually develop better training to help professionals.

The ability to stay abreast with industry through professional organizations, have been critical in the development and advancement of the research approach. Working with professional groups has provided PBSRG the advantage of gaining a real understanding of industry problems and issues. What is unique about the success of the NTRA is its ability to actually fix the industry's problems and issues. One of the most important advancements for the NTRA is the development of all current explanations for the NTRA. Due to speaking to thousands of professionals, and explaining concepts repetitively, the understanding that simplicity reduces decision-making became clearer.

3.7.2.2 Implementing NTRA Characteristics

Over two decades of presenting at industry and academic conferences the following list are major professional groups that were pivotal to the advancement and development of the NTRA [for all details below see Appendix E]:

- Neogard Alpha Program

- American Society of Healthcare Engineering (ASHE)
- International Council for Research and Innovation in Building and Construction (CIB)
- Construction Owners of America (COA)
- International Facility Managers Association (IFMA)
- Project Management Institute (PMI)
- National Institute of Governmental Purchasing (NIGP)
- SKEMA Business School

Neogard Alpha Program - a program to assist high performing roofing manufacturers, by identifying techniques to differentiate offerings and reduce risk to all parties (PBSRG 2014).

- Led to the development of the Alpha Program
  - First program to identify high performing contractors and list them as the only contractors that can install a special roof sprayed in place polyurethane foam called Permathane.
  - The program increased the roofing industry by maintaining a 98% satisfaction rating, and 98% of roof installation rate without leaks.
  - Became the pioneer of industry presentations.
  - The longest running research clients, validating the NTRA is sustainable.
- Led to the Federal Aviation Association

- Conducted 6 years of testing and delivered 55 projects over $13M worth of services.
- Identified the traditional procurement structure was inefficient.
- Identified the risk management portion of the PIPS/PIRMS was the most important.
- Validated when PIPS was only used as a procurement tool and its risk management section was removed, it led to lower performance.
- Validated that any use of MDC will decrease project performance.

- Led to the State of Hawaii
  - Delivered over 200 projects, mostly roofing.
  - Identified that each project should be tracked with a weekly risk report.
  - Validated the alignment of experts in a NTRA environment will increase production by 100%.
  - Validated the biggest cause of risk to the PIPS was a misunderstanding of the model and an unwillingness for a client to release control over the expert vendors.
  - Validated the traditional research approach of procurement was inefficient, added less value, and costs more in the end.
  - The procurement selection matrix DIM was removed, and replaced with a simple linear matrix.
  - First time a native research group conducted an audit on the NTRA and validated many of the metrics found in section 3.6.

American Society of Healthcare Engineering (ASHE) - is the largest association devoted to optimizing the health care physical environment (ASHE 2014).

- Led to the U.S. Army Medical Command
    - Ran 600+ projects worth over $1B.
    - First identified PIPS's selection model can be dropped to only incorporate its risk management model, calling the new system PIRMS.
    - Fully developed a weekly risk reporting system, to identify deviation in a projects cost and schedule.
    - Validated if risk is transferred to expert vendors, they can develop a plan to mitigate and manage it.
    - Validated PIRMS structure forces preplanning, and minimizes the risk the vendor does not control.
    - One of the longest running research clients, validating the NTRA is sustainable.

International Council for Research and Innovation in Building and Construction (CIB) - is a worldwide network of over 5000 experts from about 500 member organizations active in the research community, in industry or in education, who cooperate and exchange information in over 50 CIB Commissions covering all fields in building and construction related research and innovation (CIBWorld 2014).

- Lead to the development of the PBSRG journal.
    - Became pivotal in publishing performance information based research.

Construction Owners Association of America (COAA) - is a national organization of public and private owners who manage facilities development and capital improvement projects (COASS 2014).

- Led to the City of Peoria
  - Conducted 55 projects worth over $389M.
  - First major local implementation of the NTRA.
  - Validated the interview portion of PIPS selection of vendors was critical.
  - Validated the importance of the weekly risk report.
  - Validated high performers do not want to cease from using the NTRA.
  - Validated that political risk is dangerous to the successful implementation of the NTRA.
  - Standardized portions of the PIPS/PIRMS.

International Facility Managers Association (IFMA) - is the world's largest and most widely recognized international association for facility management professionals (IFMA 2014).

- Led to the development of the Facilities Management Graduate Master's Program at the DEWSC at ASU.
- Master's program is the main platform for continually developing education for industry seeking professionals.
  - Integrates all NTRA classes in program.

- Platform for marketing NTRA to graduate students and program affiliated professionals.
- Supports PBSRG by identifying foreign students with research opportunities to create worldwide database of similar research.

- Led to the State of Minnesota
  - Procured 400+ projects and services worth over $150M.
  - First time in history, the NTRA changed the state laws to allow the use of it.
  - One of the longest running research clients, validating the NTRA is sustainable.

Project Management Institute (PMI) - is the world's leading not-for-profit professional membership association for the project, program and portfolio management profession (PMI 2014).

- Led to Arizona State University
  - Conducted 16 projects worth over $1.7B.
  - First project was a software project, which became the first non-construction project.
  - Ran the largest and most successful dining services project in history.
  - Saved ASU $100M in cash, one of the largest savings in ASU history.
  - Ran the most successful IT networking projects in ASU history that led to a $2M cost savings and an uptime increase from 99.802 to 99.998.

    - Identified setting up a transparent structure upfront is critical, due to the ineffectiveness of contracts.
    - The PIPS/PIRMS will identify and define the detailed delivery of services or final products the client will receive.
    - One of the longest running research clients, validating the NTRA is sustainable.
- ASU led to the country of Canada
    - Second successful implementation of the NTRA outside the U.S.
    - Conducted over 34 projects, totaling over$26M.
    - Validated the NTRA can be successfully implemented in a country outside the U.S.
    - Second country to implement NTRA from coast to coast.

National Institute of Governmental Purchasing (NIGP) - is a national, membership-based non-profit organization providing support to professionals in the public sector purchasing profession (NIGP 2014).

- Led to the State of Oklahoma
    - Conducted 20 projects worth $100M.
    - Became the most successful implementation of the NTRA in PBSRG history.

- Led to the understanding most expert vendors are blind or non-experts, and they require assistance to learn how to be proactive and minimize risk they do not control.
- Identified the PIPS/PIRMS model helped clients identify high performers without technical expertise.
- One of the longest running research clients, validating the NTRA is sustainable.

SKEMA Business School - is an international business school (SKEMA.org).

- Led to the country of the Netherlands
  - First successful implementation of the NTRA outside the U.S.
  - First country to translate PIPS/PIRMS model into another language.
  - Second time a native research group conducted an audit on the NTRA and validated many of the metrics found in section 3.6.
  - Conducted NTRA testing on over 30 projects with a 1B euros budget.
  - One of the longest running research clients, validating the NTRA is sustainable.
  - First time the NTRA changed the procurement laws in another country to allow all professional organizations to use it.
  - Major platform for international research in Europe.

3.7.2.3 NTRA Characteristics Conclusion and Results

As seen in Table 1 below, the (Prof. Orgs.) component of the NTRA has been very important in the strategic operation of exposing the NTRA and partnering with research clients to run tests and implement the concepts. The (Prof. Orgs.) component has done an effective job of tying in communication with industry, to figure out what types of tools it needs to resolve real issues.

Table 1: Marketing Results

Criteria	Metric
# of major professional groups	8
# of presentations	700+
# of attendees	1300+
# of clients	123
% of clients from presentations	95+
Research $$	15.9M
# of issues resolved	32
# of advancements and developments	37
# of papers	300+

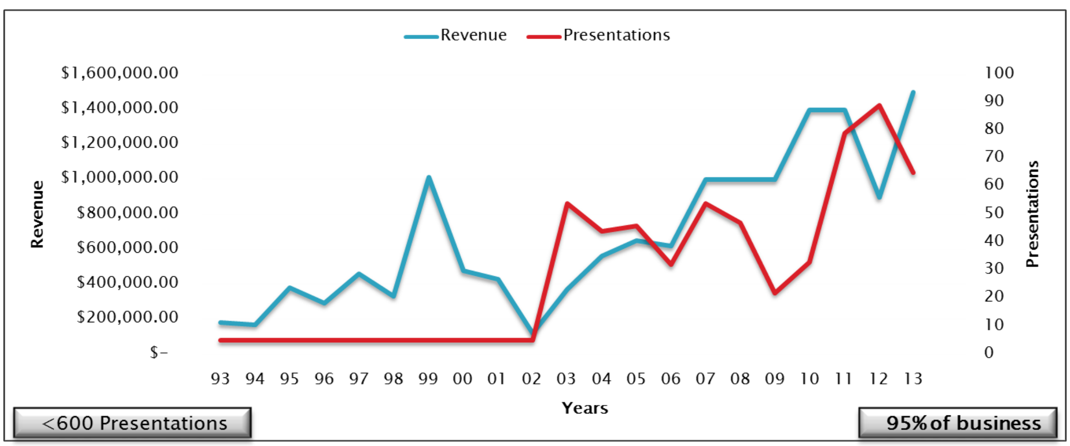

Figure 4: Presentations to Revenue Chart

There have been more than eight professional organizations that PBSRG has worked with in the last two decades. The eight listed have led to major impacts in industry and the development and advancement of the NTRA. What is significant about the (Prof. Orgs.) component is PBSRG has received over 95% of its research clients from it (see Figure 4). Also in Figure 4, the number of presentations over the last two decades almost parallels the research funding from clients. PBSRG has given over 700 presentations in the last 20 years that has led to over 1700 NTRA tests and $15.9M of research in expertise. PBSRG has identified over 32 issues plaguing the industry with non-performance, and has provided solutions through its model advancements and continuous improvement to all 32. PBSRG is now focused on exposing the concepts to professional organizations that are in silos, or geographically separated from it. PBSRG's strategic plan is to continue to expose the NTRA as the only way to run projects and educate any level of people, throughout the remaining parts of Europe, Asia, and the Americas.

3.7.3 NTRA Component III: Publications and Documentation (PUB)

3.7.3.1 Introduction

The main purpose of the (PUB) component is to publish new methods and approaches to solving industry non-performance. The (PUB) component is the main vehicle for peer-reviewed publications that reflect what is possible in industry. PBSRG has identified that its only goal is to publish documented performance results that add value. It has identified the traditional approach of publications as the following [for all details below see Appendix E]:

- Publish for recognition in academic silos.
- Add little value to resolving industry non-performance.
- Majorly identify current industry practices.
- Are majorly expert surveyed and not case study tested.
- Concerned with impact factor rating [a rating given to journals that are referenced in other journals; ratings from low to high impact is determined by the number of times a journal is referenced in other journals] and not added value.
- Written toward a particular journal's bias and not results found from prototype tests in industry.

The (PUB) component ties into the (R&A) component from the (Prof. Orgs.) component, by publishing all its results in peer-reviewed journals. The journals and academic papers are used as training documents for research clients. The value added to research clients is documented case studies that identify what PBSRG has found in its research over the last two decades, and what clients could expect if they learn, understand, and fully implement the NTRA characteristics in their companies. PBSRG has identified the following about its publications:

- Publish all lessons learned, advancements, and developments from research clients.
- Identify what issues industry is facing or will face.
- Identify party constraints from research projects.
- Identify value added or impact of NTRA in industry.

- Identified impact factor is a poor measurement of value added in industry.
- Publish results in any journal [not just construction].
- Published results are useful for entire supply chain.

3.7.3.2 Implementing NTRA Characteristics

The NTRA has two major components that had led to its success by tying in professional groups into industry integration, and what new advancements and developments can be published to reflect all industry impact, and reflect what is possible for those who are willing to change paradigms. The two main components are the CIB W117 Journal, and the PBSRG worldwide database.

International Council for Research and Innovation in Building and Construction (CIB)

CIB was established in 1953 as an association, whose objective was to bring internationals and government research institutes in the building sector together for collaboration. CIB members are institutes, companies, and other professional organizations involved in research and testing. PBSRG became involved with CIB when it created the task group (TG) 61 and later the working commission (W) 117 groups. Dr. Dean Kashiwagi initially served as a session Chairperson of Innovation Construction for the Joint Symposium of CIB W55, W65, and W107, Singapore. The TG 61 was approved by the CIB, due to CIB identifying the innovative results of PBSRG in the construction industry. CIB suggested the PBSRG research be created into the task group TG61, to verify it could be successful in further implementation, and if so, would be transformed into a working commission (W117). As stated, the TG 61 was eventually elevated to a working commission, due to a worldwide study conducted in 2008 by the TG 61, which identified PBSRG as the only innovative system that has impacted industry in many years (see section 2.5). The partnership between CIB and PBSRG had the following characteristics (Kashiwagi, et al., 2009a; PBSRG, 2014):

- TG 61 was non-traditional and sought experts.
- It set up platforms for PBSRG to enter China, Malaysia, Botswana, and Australia, and expose these countries to the NTRA.
- The success of the TG 61 set up the CIB W117 working commission, which was approved in 2008 by the CIB, to be managed by PBSRG.
- The CIB W117 has become a critical piece to the strategic "Patton" approach of PBSRG, to actively publish peer reviewed data that identifies the impact of the NTRA models testing in both construction and non-construction industries.

Saudi Arabian Effort

In 2013, PBSRG identified a large influx of Saudi Arabian construction management graduate students in the last couple of years at the DEWSC. Many of these graduate students attended the NTRA courses, with a need to find research opportunities. PBSRG identified Yasir Al-Hammadi in spring 2013, to conduct research at PBSRG for five years, while he completed his PhD at Arizona State University. PBSRG aligned Yasir's research efforts to develop a worldwide database that identifies any organization around the world that practices similar NTRA characteristics, and to continuously document and track the global performance of the construction industry. PBSRG has identified more than five new Saudi Arabian students since Yasir, who are now part of a conglomerate team of Saudi Arabian researchers that are responsible for the database. The Saudi Arabian effort has the following characteristics:

- Has been working efficiently for nearly two years.
- Team of researchers is now <5.
- Aligns the efforts of Saudi Arabian students in need of construction research opportunities with PBSRG's sustainability structure (see section 3.5.4).
- It aligns with the (Prof. Orgs.) component, by identifying potential stakeholders [countries, developers, clients, research groups, universities, professional groups, etc.], to reach out toward and expose the NTRA concepts.
- Has already sifted and documented hundreds of published papers, websites, and personnel contacts, identifying current performance in industry and potential stakeholders.
- Has not been able to identify any organizations similar to PBSRG.
- May be a viable approach to entering into Saudi Arabia, and identify potential stakeholders, who would be willing to test the NTRA concepts and publish the results.

3.7.3.3 NTRA Characteristics Conclusion and Results

As seen in Figure 5 below, publications were low and stabilized until 2001 to 2002, when a spike occurred. This was around the period PBSRG first began running major prototype testing on new/large construction projects, and began documenting the major advancements and developments it made to its NTRA models. PBSRG has always steadily published its results in journals, but the successful alignment of PBSRG and CIB, through the operation of the (Prof. Orgs.) component, became PBSRG's main vehicle for publishing peer-reviewed journals.

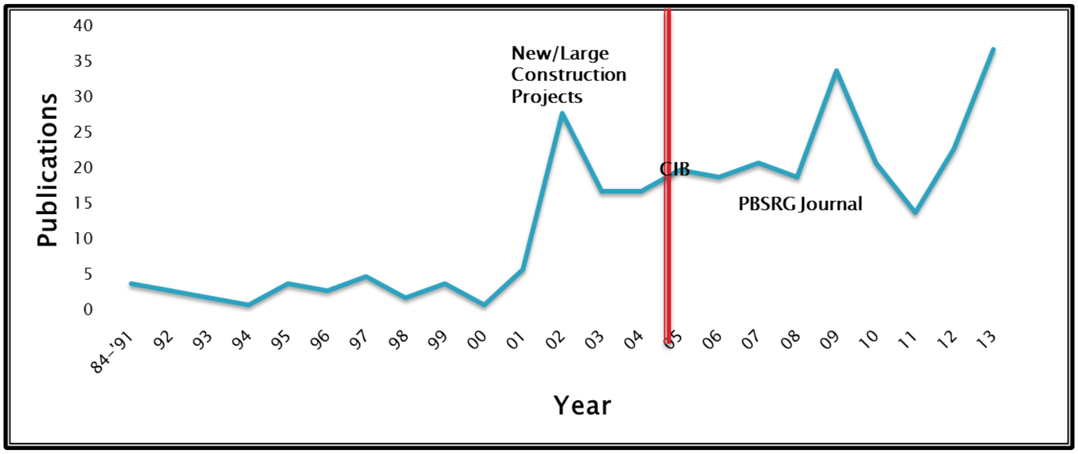

Figure 5: PBSRG Annual Publications

Prior to the establishment of CIB W117, PBSRG published 97 academic papers, and after the establishment of CIB W117, PBSRG published over 210 academic papers. What PBSRG has published in 24 years leading up to CIB W117, has more than doubled its publications in less than half the time. PBSRG identified publishing papers in non-CIB W117 journals are more difficult and time consuming, due to its primary focus on the research methodology and not the impact identified in industry from prototype testing results.

Lastly, PBSRG has identified a new approach to align its efforts of documenting global construction performance, by the development and management of a worldwide database by Saudi Arabian graduate students. Both initiatives add value to the (Prof. Orgs.) and (R&A) component of the NTRA, because it provides a laser beam focus on what industry is in need of, and who in industry may be willing to learn the NTRA characteristics and implement it in their company, to help resolve any non-performance they may be experiencing.

3.7.4 NTRA Component IV: Education (EDU)

3.7.4.1 Introduction

In order for a professor/researcher to become an expert, he or she must set up a structure that reduces non-value adding duties, such as academic administrative duties. The main purpose of the (EDU) component is it is a structure that enables the professor/researcher to (see Appendix E):

- Only teach in area of expertise.
- Merge teaching with academic expertise, and offer students both learning and accurate, and latest industry practices.
- Create a succession plan or pipeline of qualified students to produce and conduct more research.

The (EDU) component ties what PBSRG has learned from working with professionals, through its industry integration approach. It continually educates the next generation on the new advancements and developments it found in the last two decades, which has been shown to add value.

3.7.4.2 Implementing NTRA Characteristics

Higher Education

PBSRG found that due to the increasing complexity and competitiveness in the world, large populations of higher education students were looking for a model that could simplify life, help them make important decisions, decrease stress and worry, increase their efficiency and productivity, and help them utilize their technical skills and education more effectively. PBSRG identified a mutual benefit that eventually led to a sustainable research structure (see Figure 6): it needed students to help run the operations and conduct supportive research, and the students wanted to learn about a model that can help them become better in life. This mutual benefit caused students to quickly gravitate toward the NTRA models, originally taught to graduate students alone from 1993-2009 (Rivera, 2013; PBSRG, 2014).

It wasn't until PBSRG's third major phase (2005-2008), that it realized the non-performance issue in industry was not a technical problem, but a supply chain issue, and was occurring in every industry. Shortly after this period, PBSRG began to look outside the silo of construction toward the Barrett, Honors College, which populated the university's top 5% of students in over 80 different concentrations, to help support the research group's sustainability structure and provide fresh new insights through new research opportunities (Rivera, 2013).

In 2009, PBSRG began teaching the NTRA models in a new course called Deductive Logic to construction undergraduate students. In 2011, PBSRG renamed the course to Deductive Logic: Leadership and Management Techniques, and partnered with Barrett, the Honors College at Arizona State University, and began teaching students from numerous concentrations. The concepts taught to students in class are the following (PBSRG, 2014):

- First understand people and their capability.
- Learn to simplify rather than complicate.
- Learn to think at a 30,000-foot level rather than in detail.
- Understand how to produce more with less effort.
- Learn how to rely on observation rather than acceptance of norms.
- Lead from an alignment model versus the traditional management, direction, and control model.
- Utilizing expertise.
- Discover who you are.

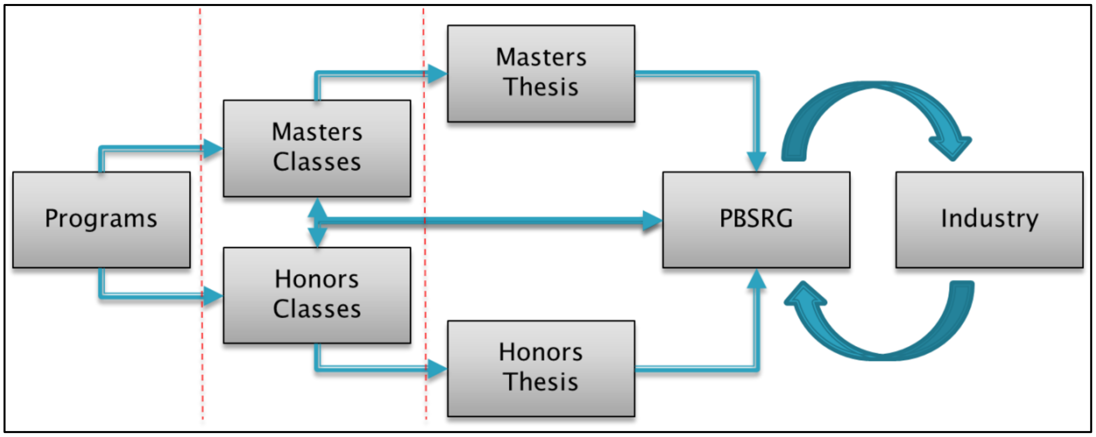

Figure 6: PBSRG's Sustainability Plan

As seen in Figure 6 above, the structure PBSRG developed for its sustainability plan is cyclical. Both graduate and honors undergraduate students are identified by PBSRG, through two programs to conduct research:

1. Facilities Management Master's Program in the Del E Webb School of Construction.
2. Honors Program in Barrett, the Honors College.

In both programs, the NTRA models are taught in numerous courses. Students given research opportunities can either, work for hire at the research group, conduct theses research on an industry that most relates to their concentration, or do both. Students have an option to look into any field of study they wish, but most students conduct research within their own concentrations. The research opportunities given to students are a win/win/win for the student, PBSRG, and industry. Students can learn from case studies PBSRG has conducted in industry or PBSRG gain new research opportunities through students, to conduct prototype testing in industry. Tables 2-5 below reflect the performance of the graduate and honors program shown in Figure 6.

Table 2: Deductive Logic Class Metrics

Criteria	Metrics
Duration	6 years
Subject Matter	Best Value & IMT
Total # of Students Educated	900+
Total # of Classes Per Semester	5
Students Enrolled Per Semester	150+
Course / Instructor Rating	4.7/ 4.8 (out of 5)
Student Concentrations	Business, Engineering, Psychology, Liberal Arts, Education, Journalism
Honors Theses	14 (out of 14)
Total # of students with documented impact	272 (30%)

Table 3: Overall Deductive Logic Class Metrics

Criteria	Metrics
Total # of years teaching concepts	21
Total # of Students	900 +
Total # of Students Recruited to support research (PhD, MS, Undergrad)	28
Total # of different degree seeking students taught	73
Total # of Engineering Students Taught	400+
Total % of Engineering Students Taught	58%
Total # of Student Credit Hours	3391
Total Classes Rating (740 students surveyed)	4.73 (out of 5)
Engineering Satisfaction Rating (35 students surveyed)	9.40 (out of 10)

Table 4: Deductive Logic Class Annual Breakdown

Annual Breakdown	Total # of Students Taught	Total Credit Hours	Ratings (1-5)
2014	553	1659	4.7
2013	246	738	4.7
2012	164	492	4.7
2011	75	225	4.7
2010	55	165	4.7
2009	37	111	4.7

Table 5: Facilities Management Master's Program Metrics

Criteria	Metrics
Duration	9 years
Subject Matter	Facilities Management
Total # of Students Educated	1400+
Total # of Classes Per Semester	4
Students Enrolled Per Semester	75+
Instructor Rating	4.76 (out of 5)
Student Concentrations	Construction Management
Masters/PhDs Theses	69

From PBSRG's sustainability structure developed in 1993 (see Figure 6); it has identified and recruited 28 students [graduate and undergraduate] to help support and continue the NTRA research. PBSRG has conducted over 69 master's theses and 14 undergraduate honors theses that have added to the NTRA's body of knowledge. With 272 students documenting impact in their lives, the author identified a windfall effect during his NTRA honors undergraduate research in 2013, after interviewing students, many of them identified impact in their life, through learning and applying the models to their lives. The models were able to give students understanding and increased ability to cope with stressful situation, disease, and extraordinary complications (Rivera, 2013). The author validated in 2013, the NTRA models can modify people's behavior without the use of management, direction, or control, by simply exposing students to logic and common sense. The author identified the following student impact results:

- Student A learned how to become more transparent in her life.
- Student B overcame depression and stopped the use of depression drugs in one semester, and has been off the drugs for two years.

- Student C was able to cope with the sudden loss of his friend due to suicide.
- Student D was able to overcome alcoholism and has been sober for over a year and a half.
- Student E overcame anger, depression and drug and alcohol abuse, and has since earned many collegiate achievements, and has been accepted into a prestigious law school.
- Student F overcame suicidal tendencies, and was eventually removed from the suicide watch list, became a leader in an ASU student debate club, and has not since reverted.

K-12 Education

Part of the research conducted by the author's honors undergraduate NTRA research, was to identify how early could students receive any value from the concepts, and if they would enjoy it. This was in part, to identify if the succession plan could begin earlier than college. In 2013, the author conducted two K-12 case studies that identified if the NTRA models could have impact on K-12 students. The two case studies were run in 2013 with the following organizations (Rivera, 2013):

- ASU High School Engineering Summer Research Program.
- Barrett, the Honors College Summer Scholars Program.

The author participated as a mentor to two engineering high school students for an eight week period during summer. The author taught the students the NTRA models, and surveyed three components of the students at the beginning and end of the program (Rivera, 2013):

1. Stress level.
2. Certainty of college major.
3. Understanding who they are.

The high school case study had the following metrics (Rivera, 2013):

- Decreased stress level by 71%.
- Increased certainty of major by 113%.
- Increased understanding of self by 70%.
- Satisfaction rating of 9.5 out of 10.

The second case study was conducted by the author and co-researcher, Jake Gunnoe, who was recruited from the honors class to support PBSRG research. The Barrett Summer Scholars Program (BSS) offers both core curriculum and elective courses offered at the Barrett Honors College at Arizona State University, as an early recruiting tool for K-12 students throughout Arizona (Barrett, The Honors College 2014). The author and co-researcher initially taught one 7^{th} grade elective class of 14 students, called Seeking Simplicity. The Seeking Simplicity course was developed from the university taught Deductive Logic: Leadership and Management Techniques course. The course performed with the following results (Rivera, 2013):

- 100% customer satisfaction.
- 80% class return rate.

The case studies validated that the NTRA models could be taught and enjoyed by students as early as 7th grade (Rivera, 2013). Due to the success of the 2013 summer program, PBSRG was asked to return in summer 2014 to teach one eight-grade class of 21 students, and two 7th grade classes of 17 and 15 students. PBSRG wanted to test the following:

- Identify if first year and Honors Program results can be replicated.
- Identify if course reduced stress level of students.
- Identify course's value in comparison to the other courses students were enrolled.
- Identify value of course and instructors [graduate research assistants in PBSRG research/education program].

The 2014 summer program had the following results (PBSRG, 2014):

- Taught over 40 students.
- Decreased stress level by 14%.
- Core curriculum class rating was 7.56.
- Core curriculum instructor rating was 8.37.
- Deductive Logic class rating was 9.39.
- Deductive Logic instructor rating was 9.77.

Table 6 below shows how the Seeking Simplicity course taught by two graduate students, held up against core curriculum courses taught by seasoned professors. Seeking Simplicity, ranked top three, twice in the eighth grade classes, and number one, twice in the seventh grade classes. The BSS program has validated the NTRA models have impact, and PBSRG's succession plan can be extended to students as early as seventh grade.

Table 6: Barrett Summer Scholars (BSS) Performance Measurements

8th Grade					
Class	**Enjoyment**	**Class**	**Rigor**	**Class**	**Instructors**
Fire & Human Behavior	3.95	Fire & Human Behavior	4	Fire & Human Behavior	3.95
Seeking Simplicity	**3.95**	LEGO Engineering	4	STEAM	3.89
LEGO Engineering	3.89	STEAM	3.89	**Seeking Simplicity**	**3.79**
STEAM	3.78	**Seeking Simplicity**	**3.79**	LEGO Engineering	3.68
Aviation	3.76	Aviation	3.67	The Human Event	3.41
The Human Event	3.1	The Human Event	3.44	Aviation	3.33

7th Grade Average					
Class	**Enjoyment**	**Class**	**Rigor**	**Class**	**Instructors**
Seeking Simplicity	**3.91**	Psychology and Neuroscience	3.91	**Seeking Simplicity**	**3.88**
Psychology and Neuroscience	3.73	Neuropharmacology of Sleep	3.83	Psychology and Neuroscience	3.8
Technology in the 20 Years	3.73	**Seeking Simplicity**	**3.82**	Technology in the 20 Years	3.73
Art & Beauty in Mathematics	3.63	Art & Beauty in Mathematics	3.8	Art & Beauty in Mathematics	3.72
Neuropharmacology of Sleep	3.52	The Biology of Dinosaurs	3.79	Logic & Reasoning	3.71
Logic & Reasoning	3.43	Technology in the 20 Years	3.76	The Biology of Dinosaurs	3.59
The Biology of Dinosaurs	3.36	Logic & Reasoning	3.68	Neuropharmacology of Sleep	3.57

Additional Efforts

Following the successful implementation of the BSS 2014, Dr. Dean Kashiwagi returned to his private catholic high school, Saint Louis School, in Honolulu, Hawaii, in October 2014, to present on the impact the NTRA models have had in K-12 and higher education. Saint Louis identified PBSRG has impact and will begin developing a new student pipeline for the sustainability of PBSRG research, and begin teaching the Deductive Logic course in the fall of 2015. PBSRG will begin by organizing a core team of educators and teaching them the NTRA concepts. The following objective will be tested in Hawaii:

- Identify if NTRA could be successfully implemented and remain sustainable in another school system.

- Identify if course can reduce stress level of students.
- Identify course's value in comparison to the other courses students are enrolled.
- Identify number of qualified students that are recruited to PBSRG.

In the fall of 2013, former PBSRG graduate student, Syed Nihas, organized PBSRG's first entry into India. The objective was to present the NTRA, and identify major universities and construction industry stakeholders. After two weeks of traveling around India, PBSRG had the following results (Rivera, 2013):

- Professor Dean Kashiwagi and Syed Nihas traveled to five cities [Mysore, Bangalore, Pune, Chennai, and New Delhi].
- Professor Dean conducted 16 presentations.
- 17 organizations attended [Indian Universities, Developers, Project Management Consultancies, and Professional Organizations].
- Total number of people who attended presentations was 1250+.
- PBSRG finalized a deal with Dr. B.G. Sangameshwara (Principal/President) and Dr. Syed Shakeeb Ur Rahman (Head of Civil Engineering and Construction Management Departments) at University of Sri Jayachamarajendra College of Engineering (SJCE) (leading engineering college), Mysore India, to teach the Deductive Logic course in fall 2014. SJCE will offer the education as a required course for Civil Engineering and Construction Management students. Class will average 120 students taught/semester.

- Potential relations with two other major academic institutions: SRM [large aggressive and innovative private university in Chennai] and NICMAR [Indian construction industry sponsored postgraduate construction management master's degree institution in Pune].

PBSRG has since developed a full online Deductive Logic platform that is currently being tested at its own university Arizona State (BVA 2014). PBSRG and SJCE postponed the fall 2014 class to 2015, due to support personnel leaving the effort and new personnel becoming acquainted with the new structure set in place. The following objectives will be tested in India:

- Identify if NTRA could be successfully implemented and remain sustainable in another country's school system.
- Identify if course can reduce stress level of students.
- Identify course's value in comparison to the other courses students are enrolled.
- Identify number of qualified students that are recruited to PBSRG.
- Identify number of students that tie in NTRA research with the improvement of Indian construction non-performance.

3.7.4.3 NTRA Characteristics Conclusion and Results

The strength of the NTRA is its sustainability structure as seen in Figure 6. Through a continuous cycle of undergraduate and graduate educators participating in the advancement and exposure of NTRA research throughout the world, it provides the professor/researcher an opportunity to develop and mentor the next generation of experts who will one day take over and grow the research effort.

From the current structure, PBSRG has been able to move from strictly graduate education, to undergraduate education, to most recently, K-12 education. Through the efforts of many student researchers, PBSRG has been able to expand its reach throughout education, and utilize its results of self-application to help industry change and understand the importance of the IMT logic. The (EDU) component helps industry see that high performance is not in micromanagement techniques, rather an alignment of who people are through a set structure that helps them see further, and a constant application of accurate principles (Deming, 1992).

3.7.5 Case Study Conclusion

3.7.5.1 Introduction

The purpose of the case study research was to answer sub-questions 2-4 (Chapter 1):

- Can the NTRA that is centered around “academic expertise” have impact on the industry and be sustainable?
- How does the NTRA have an impact on industry and academia?
- Can the NTRA, which is attempting to change the industry and academia, overcome resistance?

To identify whether the NTRA has had impact in industry in the last two decades, the author investigated the entire history of PBSRG and further investigated 22 case studies on the NTRA. The author found the NTRA models have been successfully implemented in industry over 1700 times, had over $6.3B of projects and services delivered internationally, with a 98% customer satisfaction, and a 9 (out of 10) client rating of process (see section 3.6). The author also identified the NTRA is the only technology of its kind in the world, and can only be accessed directly through Arizona State University. The non-traditional research group, PBSRG, has successfully implemented and shown sustainability of its NTRA, through numerous long-term partnerships, achievements, and implementations of its models through the following (See Appendix E): States of Minnesota and Oklahoma, Arizona State University, the Netherlands and Canada, and professional groups IFMA and PMI.

3.7.5.2 NTRA Components

To identify how the NTRA has had impact in industry and academia, the author identified four major components (see Figure 7):

1. Research testing and analysis (R&A)
2. Professional organizations (Prof. Orgs.)
3. Publications and documentation (PUB)
4. Education (EDU)

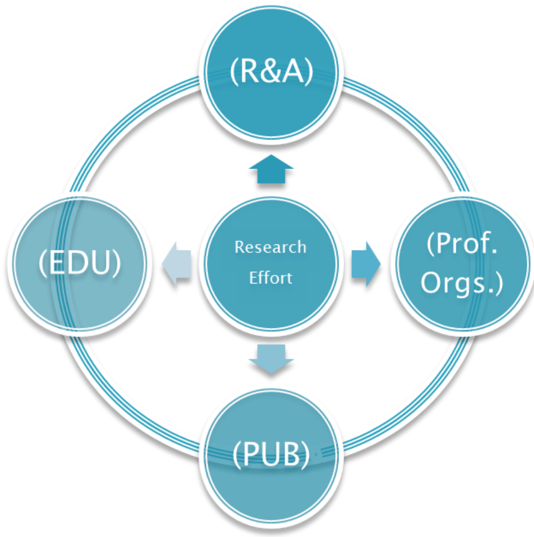

Figure 7: NTRA Components

What makes each of the four components unique are not the defined silos they appear to operate within, rather, the integration of each component that cannot operate efficiently without the direct benefit of the remaining components. It is not uncommon for entities in industry and academia to have numerous components in its operations, but the understanding of how each component relates and works in tandem to another is diluted as an entity becomes larger, due to the increase in bureaucracy [MDC]. In part, the success of the NTRA is its intrinsic properties of transparency, and accountability, through performance measurements. Each component is directly related to the successful operation of another component, due to the structure set up that each component causes one or more different components to become successful. When one component suffers, one or more other components suffer; therefore, without having to enforce awards and punishments, the transparency of the structure drives the accountability of those operating a particular component, to either pick up the slack or utilize the expertise of others to resolve any problem or issue. With a transparent structure, there is an internal balance of self-correction within all four components, due to each component being accountable to another, therefore increasing the research group's overall efficiency.

Each of the four components work together by the following [See Appendix E for all details]:

- The research and analysis (R&A) component:
    - Sets the operation of the entire research effort, by developing a funding model that thrives, through solely focusing on solving real industry needs and issues, and not submitting lengthy research grant proposals.
    - The success of the research and analysis component is to develop a structure that provides access to continual work with industry and test the NTRA models, which continually improves them, through new advancements and research developments.
    - By only solving real industry problems and issues, the research group needs a component that can both expose the research group to industry problems and issues, and a platform to integrate industry by exposing the NTRA to attract visionary research clients.
    - The component that drives the success of the (R&A) component is the marketing and industry integration (Prof. Orgs.) component.

- The marketing and industry integration (Prof. Orgs.) component:
    - The main source of meeting research clients/donors, by reaching out to professional groups in numerous industries and opening up space to both partner with the professional groups and/or present the NTRA concepts at their national or international conferences.
    - A goal initially started with presenting no less than 20 times per year in the first decade of the research group, to now presenting over 60 times a year in its second decade. The (Prof. Orgs.) component is responsible, through its partnerships/conference presentations platform, for 95% of research clients/donors for prototype testing.
    - Through continuous outreach efforts, the (Prof. Orgs.) component has become the main source of continuous development training materials and NTRA concepts explanations, for both professionals and education (EDU) component.
    - As the (R&A) and (Prof. Orgs.) component feed each other, the research group needed a component that identified what it was finding [success and advancements] in industry, and wanted to reflect to other research academics and industry entities what was possible through its testing results. In addition, the research group needed a way to document the evolution of the NTRA over the coming years.

- The publications and documentation (PUB) component:
    - Became the component that was driven to success by the (R&A) component, and assisted the (Prof. Orgs.) component, by creating another platform to expose the results of the NTRA.
    - The (PUB) component's objective is to publish all lessons learned, advancements, and developments from academia and research clients. In addition, it serves the purpose to document what issues industry is having or will have, and identify what value the NTRA is having or could have to resolve those issues.
    - Lastly, the component is unconcerned about publishing for academic recognition amongst its peer groups; rather, it is concerned with publishing all its results in any journal, exposing the testing results that may be useful to the entire supply chain.
    - As a research group continues to seek industry and solve its problems and issues, simultaneously developing and maturing its NTRA models, it must develop a sustainable operations structure that frees up the hands and administrative duties of the experts within the research group.

- The education (EDU) component:
    - Creates the success of all research components, through achieving its goal of only teaching in area of expertise. In this manner, students who learn and understand the concepts of the NTRA can benefit from the expert

researcher/professor's merging of their teaching with the academic expertise gained from industry research testing. Additionally, students are offered both learning and accurate, and latest industry practices.

  - With a supply chain of students moving through the research group's courses, it can frequently identify qualified students from both its graduate and honors undergraduate programs, who can produce and conduct more research for the research group.

3.7.5.3 NTRA Overcoming Resistance

To validate whether the NTRA has overcome industry and academic resistance, the author further investigated 6 out of the 22 case studies [see Appendix E for all details]:

- State of Minnesota
- City of Peoria
- State of Hawaii
- National Science Foundation
- The Netherlands
- Barrett, The Honors College

State of Minnesota

The State of Minnesota is one of the longest running research clients, and has overcome resistance of the NTRA. It has had the following NTRA results:

- Used the NTRA PIPS over 6 years.

- Total number of projects was 400+.
- Total award cost was over $169M+.
- Percentage of awards to best value contractors was above 50%.
- Average customer satisfaction was 9.5 (1-10).
- Changed state procurement laws to allow

The first research client in Minnesota was the University of Minnesota (UofM), which is one of the largest universities and bureaucracies in the United States. The UofM's Capital Planning and Project Management (CPPM) was an early adopter of the NTRA's PIPS/PIRMS models. The CPPM group is responsible for the delivery of all new and existing facilities on the Minneapolis Campus, which procure on average over 300 projects annually. Due to the efforts of Mike Perkins, Associate VP of CPPM, the NTRA became law. The state permitted the use of the models as an alternative to the low-bid system, making the models the first of its kind. There were three phases in the implementation of the new law (Kashiwagi, et al., 2008a; Kashiwagi, et al., 2010a; PBSRG, 2014; Kashiwagi, 2014):

- In 2007, the law permitted state agencies, counties, cities, and school districts [with 25% highest enrollment] to use best value.
- In 2009, the state includes an increase to school districts with a 50% high of enrollment.
- In 2010, all political subdivisions were permitted to use the NTRA models.

City of Peoria

Up until early 2000s, the City of Peoria was required by law, to only award projects based on the lowest cost. This priced based environment resulted in 75% of the price-based contracts not delivering on time and had a 75% change order rate with a 20% customer satisfaction rating. In 2004, the City of Peoria became a research partner of PBSRG, to begin testing the NTRA models. Due to the law change in the early 2000s, the City of Peoria could not identify alternative project delivery methods to select construction firms. Despite the laws, the City of Peoria was allowed to use the PIPS process under the Design-Build and Construction Manager at Risk delivery process. This allowed the City of Peoria to choose a contractor based on performance and not price. The City of Peoria resulted in the following (Kashiwagi, et al., 2004b; Sullivan, et al., 2006; Sullivan, et al., 2010; PBSRG, 2014; Kashiwagi, 2014):

- Peoria implemented PIPS on 55 projects, totaling over $389M from 2004 - 2009.
- Overall change order rate was reduced by 99%.
- Project delay was reduced by 77%.
- Customer satisfaction was increased by 395%.

State of Hawaii

Due to political resistance, the State of Hawaii and Hawaii Department of Transportation ceased from using the NTRA models after five years of successful implementation:

- Delivered approximately 100 roofing and painting projects, 100 school modification projects, and a few waterproofing projects between DAGS and UH.

- Project management on roofing projects were reduced by 80%.
- Average performance rating of roofing contractors was 9.5.
- Design costs were reduced from 11% to 2.5%.
- Delivered all 11 University of Hawaii (UH) projects 100% on time and budget.
- 90% of projects from the UH were ahead of schedule.
- UH change orders decreased by 75%.
- Satisfaction rating of contractors was 9.2.
- No change orders.
- PIPS project managers did 10 times the projects of traditional project managers.
- Roofing contractors did work twice as quickly as contractors who were hired by low-bid.
- Industry in Hawaii was in support of the PIPS.

The State of Hawaii was the only legal protest that went to court in early 2002, and led to the only legislative document publishing the performance of the NTRA models in 2000. The Department of Accounting and General Services (DAGS) conducted an internal report on the NTRA system that hypothesized it was less costly and provided higher performance for procuring the retrofitting of roofing systems. DAGS audit was on the PIPS design-build cost versus the traditional design-bid-build [low-bid] construction deliveries. The results identified the following:

- PIPS cost was 2.5% versus traditional cost of 11%.
- PIPS project management cost was .40% versus traditional cost of 1.90%.

- PIPS construction cost was -5.6% versus traditional cost of -2.30%.
- PIPS cost of quality was -2.7% versus traditional cost of 11.1%.
- Overall, the DAGS audit identified PIPS as saving the State of Hawaii 13.8% versus the traditional low-bid system.

In 2002, despite the overruling of the protests, and Charlie Serikawa (University of Hawaii project manager) ready to award 17 UH painting projects, with a 67% cost savings using PIPS over the traditional low bid system, the decision to terminate PIPS was made. The University of Hawaii chose to return to the low-bid environment, and in 2005 tried to develop a performance based process with no success. Due to frustration with the system, Charlie Serikawa retired and became a private consultant.

National Science Foundation

PBSRG proposed the NTRA models to the National Science Foundation (NSF) as a grant proposal in 2004. The NSF identified the research as poorly constructed and not relevant, and did not give PBSRG a grant. When learning of the NSF, Harvard University funded an entire project consisting of six (6) midsize construction tests that delivered at lower costs, higher performance, minimization of project management functions, compared to existing Harvard construction management results. The Harvard test resulted in Harvard University winning the 2005 Corenet Global Innovation of the Year Award.

The Netherlands

In the early 2000s, the Dutch construction industry experienced collusion. The majority of general contractors, subcontractors, and material suppliers were participating in price collusion on Dutch construction projects. In 2002, the Dutch government created the Netherland's Parliamentary Inquiry Committee of Construction Fraud (NPICCF). The NPICCF recommended three things (Kashiwagi & Kashiwagi, 2011; Santema, 2011; Rijt & Witteveen, 2011; Kashiwagi, et al., 2012a; Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013):

- First, procurement policies should be uniform.
- Second, public authorities needed to adapt their procurement towards more integrated project delivery models, such as Design Build & Design Build Finance Maintain.
- Third, make use of award criteria based on price and quality (i.e. most economically advantageous tender or "MEAT"). The most specific way to accomplish this was the NTRA models.

After hearing Dr. Dean Kashiwagi, Director of PBSRG, present at an international SKEMA conference in Paris France, on the NTRA, visionary George Ang from the Ministry of Housing (Dutch Government), became intrigued with the approach and identified a potential solution to the collusion problems in his country. It is important to notice that George Ang, choose an American academic researcher to solve the construction problem in the Netherlands After overcoming the resistance of an American research group attempting to change the industry of another country, language barriers, and government bureaucracy, the NTRA has had the following results (Kashiwagi & Kashiwagi, 2011; Santema, 2011; Rijt & Witteveen, 2011; Kashiwagi, et al., 2012a; Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013):

- From 2006 to 2013 national procurement laws were changed to allow the NTRA models to be used by every major project management and procurement system.
- The NTRA models have been applied over 200 times, with a budget spend of over 2 B €.
- 26.8% (56 projects) in the private sector and 73.2% in the public sector (153 projects). Within the public sector projects have been executed at several organizational levels.
- 8 projects at 4 different provinces.
- 27 projects in 17 different municipalities (7 of the 10 biggest municipalities have applied the best value approach).
- 29 projects at 14 different water boards (out of 25 water boards in Netherlands).
- In total an estimated 107 projects in the construction industry, 31 projects in ICT, 5 catering projects, 3 security projects, 16 commodities, and 9 in health sector have been completed.

Barrett, The Honors College

In 2009, PBSRG developed its first NTRA undergraduate class, Deductive Logic: Leadership and Management Techniques, in the Del E Webb School of Construction

(DEWSC) at Arizona State University. The initial challenges were the following (Rivera, 2013):

- Minimal marketing effort to raise awareness of class.
- Only two people showed up for the first class.
- Slow growth rate the first two years.
- Was an elective course, and not offered in the construction program.

The first two years were successful in educating students who participated, but unsuccessful in raising awareness of its impact to more students across the campus. Due to the efforts of PBSRG and Margret Nelson, Associate Dean of Barrett Honors College, the new NTRA class became part of the honors program in 2011. The new partnership between the DEWSC and The Honors College, turned the class around, and has now become one of the most popular honors classes, with students filling up all five (5) classes within two (2) hours of them opening for registration (see section 3.7.4).

3.7.5.4 Conclusion

The structure of the NTRA has proven to be controversial, yet able to overcome many industry and academic resistances. The NTRA has the following characteristics conclusions:

- Many industry and academic personnel initially feel uncomfortable with the NTRA, because it identifies the traditional model as inefficient and ineffective.
- It forces academics and industry leaders to change [higher rate of processing].

- Requires understanding, courage and accountability [real vision and not memorizing details].
- The results show performance and creates insecurity among researchers who “have little to no documented results of impact” in industry and academia, and who have “recognition” only in academic circles [no industry expertise].
- The NTRA’s documented industry and academic results supersede peer reviews, due to its cause of impact and change in industry.

Chapter 4

CONCLUSION

4.1 Introduction

This thesis focused on a non-traditional research program at Arizona State University, which has had success in impacting both industry and academia for over twenty years. The research purposed to document the performance of the non-traditional research program, and by investigating its research approach's structure, knowledge could be discovered to improve the traditional approach to research.

To ensure the results of this research were valid, questions were formulated to help better define the objectives and structure of the study. The main research question proposed was: *What characteristics of the non-traditional research approach (NTRA) that are different from the traditional research approach (TRA), help improve the performance and value of the traditional research approach, and identify the problem of non-performance in industry?*

The answer to this question was divided into four main parts devised into the following sub-research questions (SRQ):

1. What characteristics of the NTRA are different from the TRA?
2. Can the NTRA that is centered around "academic expertise" have impact on the industry and be sustainable?

3. How does the NTRA have an impact on industry and academia?
4. Can the NTRA, which is attempting to change the industry and academia, overcome resistance?

This research was started in 2014. Each step of this research was able to provide answers to each of the questions above. The answers to the questions identified exactly what caused the NTRA to develop a sustainable, industry impacting, and academic expert based research program.

This section reviews each sub-research question (SRQ), and the answers found in the research provided. The SRQs were related to the methodology of the research as follows (SRQ # – Research Methodology):

1. SRQ 1: To identify what characteristics in the NTRA were different than the TRA, a literature research was conducted by identifying six major characteristics related to each research approach, and then comparing the findings to identify the differences.
2. SRQ 2: To validate if the NTRA could have impact on industry and academia, a case study research was conducted on the Performance Based Studies Research Group [developer of the NTRA], to identify if the unique NTRA characteristics and structure could improve customer satisfaction and value (cost, flexibility, time, and quality) of services in industry..

3. SRQ 3: To understand how the Performance Based Studies Research Group was able to impact industry and academia using the NTRA, the author investigated the entire history of the research group, and documented from its initial perception of need, through its beginnings, how and why it was structured, and the evolution of its research advancements and developments that were direct lessons learned from over twenty years of industry and academic testing and implementation.
4. SRQ 4: An analysis of the case study research was conducted on two industry research clients and one educational program that verified the NTRA could overcome resistance in industry and academia.

The research was able to identify the unique characteristics of the NTRA, and validate that the characteristics identified did increase the customer satisfaction and value added to both industry and students.

4.2 SRQ 1 – What characteristics of the NTRA are different from the TRA?

SRQ was answered through a literature research. This research consisted of the following:

- Review of literature in the construction industry for performance information and research approaches.
- Review of literature for research characteristics of traditional research approaches, and two large reputable research institutions.
- Review of literature for the non-traditional research approach.

The literature research identified six (6) major characteristics that make up both the traditional and non-traditional research approaches:

1. Research approach
2. Funding model
3. Development of expertise
4. Theoretical contributions
5. Academic status
6. Industry implementable research

After comparing the non-traditional approach with the traditional, there were nine (9) main differences that separated the non-traditional from the traditional:

- No-influence, no control, no management philosophy.
- Emphasis is on deductive logic [case study], hypothesis, and test results, instead of inductive logic [data analysis].
- The research expert is only focused on becoming an expert [10 to 20 years].
- The research expert only teaches in area of expertise.
- The research expert has a sustainable research structure, through testing current industry needs with research clients, rather than working from research grants to report on current industry best practices.
- Research structure applies to all industries and academic programs [undergraduate and graduate] and concentration areas.

- Research expert is able to publish repeated dominant industry and academic tests and consistent results, to override negative peer reviews.
- Research expert understands industry does not understand the source of their own problem, so the research expert must be creative, innovative, a visionary leader, and work outside of the construction industry to find the solution.
- The expert researcher’s performance, test results, research structure and publications must be simple, easy to understand, and implementable by industry and academia.

4.3 SRQ 2 – Can the NTRA that is centered around “academic expertise,” have impact on the industry and be sustainable?

SRQ 2 was answered through a case study research. The author investigated over twenty-two (22) case studies that implemented the NTRA models PIPS/PIRMS in industry. The case studies included, but were not limited to the following services:

- Software
- Roofing
- Facilities Management
- Large Construction
- Dining Services
- Healthcare
- Academic/Educational
- Supply Chain Management

The results from NTRA model's tests were the following:

- 1700+ projects and services delivered (construction and non-construction).
- $6.3B of projects and services delivered.
- 98% customer satisfaction.
- 9.0/10 client rating of process.
- 57% of the time, the NTRA models selected the highest performing expert for services that is the lowest cost.
- Decreased the cost of services on average by 31%.
- Contractors/vendors were able to offer the client/owner 38% more value.
- Decreased client efforts by up to 79%.
- Change order rates were reduced to as low as -0.6%.
- $15.9M in research funding generated.
- 12 National/International Awards.
- 38 Arizona State University licenses.
- International recognition/implementation [Canada, Netherlands, Botswana, Malaysia, Australia, Democratic Republic of Congo, France].
- Largest projects: $100M City of Peoria Wastewater Treatment DB project (2007); $53M Olympic Village/University of Utah Housing Project (2001); $1B Infrastructure project in Netherlands (2009);

Additional value documented from the case studies were the following:

- Contractors/vendors became more proactive and prepared to resolve risk they could not control, due to the pre-planning aspect of the NTRA PIPS/PIRMS models.
- Contracts were identified as useless, and the pre-planning aspect of the models, eliminated any disputes, due to its transparent structure set up at the front of any contract, allowing everyone to see what will be required of each party.
- The research validated the client/owner is the main source of risk, and could be avoided by replacing MDC with expertise.

The results of the case study research identified the NTRA that is centered around "academic expertise," could improve customer satisfaction and value (cost, flexibility, time, and quality) of services in industry.

4.4 SRQ 3 – How does the NTRA have an impact on industry and academia?

SRQ 3 was answered by investigating the entire history of the Performance Based Studies Research Group, and documenting how it impacted industry and academia, through its evolutionary research advancements and developments. The author created a timeline that preceded the research group, from 1983 to 2014, and documented every category related to the research group [strategic plans, professional organizations, presentations, clients, licenses, major case studies, research advancements and developments, very important people, major resistances, publications (articles, books, etc.), major awards, and courses], and identified the patterns of each category's succession upon one another and growth rational [when, where, what, why, and how to evolve to the next step in research]. The author identified four major components of the research group and its research approach that encompasses each category:

1. Research testing and analysis (R&A)
2. Professional organizations (Prof. Orgs.)
3. Publications and documentation (PUB)
4. Education (EDU)

The author identified each of the above four major components work in unison, and cannot be successful without the direct success of one or more other components. The following conclusions were drawn about the major components:

- NTRA is a more efficient alternative, than the traditional research approach.
- Sustainable, proven in industry and constantly changing.
- The (Prof. Orgs.) component is responsible for 95% of research clients.
- The (R&A) component is fed by the (Prof. Orgs.) component, and conducts prototype testing with research clients and academic programs.
- The (PUB) component exposes the continuous improvement and consistent test results to industry and academia, for the encouragement of what is possible. Also, it consistently documents the performance of the construction industry, attempts to identify similar research approaches around the world, and potential stakeholders for future research opportunities.

- The (EDU) component is the structure set in place through graduate and undergraduate programs, to identify qualified students to produce and/or conduct more research opportunities. Additionally, these students are the operations skeleton that frees up the hands of expert researchers within the research group.

The results of the Performance Based Studies Research Group's historical timeline, identified the NTRA is sustainable, proven in industry and constantly changing.

4.5 SRQ 4 – Can the NTRA, which is attempting to change the industry and academia, overcome resistance?

SRQ 4 was answered through an analysis of six (6) out of the twenty-two (22) case studies in the case study research [see Appendix E for all details]:

- State of Minnesota
- City of Peoria
- State of Hawaii
- National Science Foundation
- The Netherlands
- Barrett, The Honors College

The investigation of each case study analysis concluded the following:

- The State of Minnesota did not have the laws in place to allow the NTRA models to be implemented statewide, but eventually were changed to allow all construction contracts to use the new models. NTRA testing has resulted in:
    - Over 6 years of implementation, on over 400 projects.
    - Total award cost over \$169M, with a customer satisfaction rating of 9.5 (out of 10).
- The City of Peoria state laws only allowed clients to choose the lowest bidders. The NTRA was eventually allowed to be used, due to city laws changing to allow alternative delivery systems, and resulted in:
    - Over 55 tests, totaling over \$389M.
    - Overall change order rate was reduced by 99%.
    - Project delay was reduced by 77%, with an increase in customer satisfaction by 395%.
- The State of Hawaii, though it had successful implementations of the NTRA models, had one of the first major charges brought against PBSRG, and resulted in an internal audit by the Department of Accounting and General Services (DAGS) in 2002. It verified the NTRA models were better performing than the traditional low bid system with the following results:
    - PIPS cost was 2.5% versus traditional cost of 11%.
    - PIPS project management cost was .40% versus traditional cost of 1.90%.
    - PIPS construction cost was -5.6% versus traditional cost of -2.30%

- PIPS cost of quality was -2.7% versus traditional cost of 11.1%.
- Overall the DAGS audit identified PIPS as saving the State of Hawaii 13.8% versus the traditional low-bid system.

- The National Science Foundation were in opposition of a grant proposal submitted by PBSRG for the NTRA, and was identified as poorly constructed and not relevant, and did not give PBSRG a grant. When learning of the NSF, Harvard University funded an entire project consisting of six (6) midsize construction tests that delivered at lower costs, higher performance, minimization of project management functions, compared to existing Harvard construction management results. The Harvard test resulted in Harvard University winning the 2005 Corenet Global Innovation of the Year Award.
- PBSRG was the first American non-traditional research group to overcome a new country entry, countrywide construction collusion, language barriers, and government bureaucracy in the Netherlands, resulting in:
    - National procurement laws changed, to allow the NTRA models to be used by every major project management and procurement system.
    - The NTRA models have been applied over 200 times, with a budget spend of over 2 B €.
    - 26.8% (56 projects) in the private sector and 73.2% in the public sector (153 projects). Within the public sector projects have been executed at several organizational levels.
    - 8 projects at 4 different provinces.

  - 27 projects in 17 different municipalities (7 of the 10 biggest municipalities have applied the best value approach).
  - 29 projects at 14 different water boards (out of 25 water boards in Netherlands).
  - In total an estimated 107 projects in the construction industry, 31 projects in ICT, 5 catering projects, 3 security projects, 16 commodities, and 9 in health sector have been completed.
- PBSRG developed an elective course in the Del E Webb School of Construction (DEWSC) that overcame minimal marketing efforts by the DEWSC, to raise awareness of class, low student registration, and slow growth for its first two years. Eventually partnered with Barrett, The Honors College, and became one of the most popular classes that has now taught over 900 students in 6 years, with a course and instructor rating of 4.7 (out of 5).

The results of this research has proven the NTRA, which is attempting to change the industry and academia, is able to overcome resistance.

4.6 Answer to Main Research Question

The research was able to answer each sub-research question, by identifying unique characteristics and structure of the NTRA, and verifying that the characteristics and structure have shown high performance in both industry and academia. The answer to the main question, "*What characteristics of the non-traditional research approach (NTRA)* *that are different from the traditional research approach (TRA), help improve the performance and value of the traditional research approach, and identify the problem of non-performance in industry?"* is the following:

- No-influence, no control, no management philosophy.
- Emphasis must be on logic, hypothesis, and test results.
- The researcher must use deductive logic [case study] instead of inductive logic.
- The research expert must be focused on becoming an expert over 10 to 20 years.
- The researcher must only teach in area of expertise.
- The researcher must create a new research structure that is sustainable.
- Research structure must apply, not only to construction industry, but all industries and can also be used in both undergraduate and graduate academic areas.
- The researcher must override negative peer reviews.
- Due to construction industry not understanding the source of their own problem, the research expert must be creative, innovative, a visionary leader, and work outside of the construction industry to find the solution.
- The researcher's performance, researcher's results, research structure and the researcher's publications must be simple, easy to understand, and implementable by the industry.
- The researcher must have repeated research tests and consistent results.

4.7 Conclusion

The investigation into the NTRA has discovered the final conclusions and lessons learned:

- NTRA is a more efficient alternative, than the traditional research approach.
- Sustainable, proven in industry and constantly changing.
- Traditional model may be "inefficient and ineffective" [focused on technical issues and technical solutions].
- Most industry participants do not understand source of industry "inefficiency" and "poor performance."
- Industry problem is a "supply chain problem" and not a technical issue.
- The solution to industry's problem is not a technical solution.
- Solution methodology is simplification, view at 30K feet and not increasing complexity and data approach.
- Problem is not technical, therefore a deductive approach is faster, more accurate, and simpler than an inductive approach.
- Approach to academic model [simplify, utilize expertise and apply concepts to improve performance]; can help change academic education/research and the industry paradigm at the same time.
- Because academic research is searching for "technical expertise," there is no competition in the non-traditional research area.

- Researchers and program directors in the area of construction management, facility management, supply chain management, and risk/project management are areas where approach can be successful.
- Traditional model at Arizona State University [Del E Webb School of Construction is now a part of School of Sustainable Engineering and the Built Environment (SSEBE), BYU [facility management] and Georgia Tech [construction management] have been minimized and put into other programs].
- Practitioners and students acknowledge value of approach.
- PBSRG case study results validate proposal.

This research has discovered a non-traditional research approach that has both improved, not only the construction industry, but multiple industries and academic programs and concentrations. The identification of characteristics and research components of the NTRA, allow traditional researchers a potential new approach to increase customer satisfaction, production, and quality of all services to both industry and academia. This research has potentially discovered a way to change and improve the traditional approach to research, and cause it to increase its efficiency and performance of all services it provides.

REFERENCES

Adeyemi, A., Kashiwagi, D. T., and Sullivan, K. (2009) "Acceptance of IMT/PIPS Philosophy in Botswana" RICS COBRA Research Conference, University of Cape Town, pp. 509-521 (September 10-11, 2009).

Adrian, James J. 2001, 'Improving Construction Productivity', *Construction Productivity Newsletter*, vol.12, no. 6.

AGC 2005/2006, Associated General Contractors of America, Available from: <http://www.agc.org/inde x.ww>. [7 March 2007].

Al-Kharashi, A., and Skitmore, M. (2009). Causes of delays in Saudi Arabian public sector construction projects. Construction Management and Economics, 27(1), 3-23.

Ang, G. (2011). Introduction for the dutch special issue: Historical overview of best value in the Netherlands, Journal for the Advancement of Performance Information and Value, 3(1), pp. 610.

Arain, F. M., Pheng, L. S., and Assaf, S. A. (2006). Contractors' views of the potential causes of inconsistencies between design and construction in Saudi Arabia. Journal of performance of constructed facilities, 20(1), 74-83. Chicago

Assaf, S. A., and Al-Hejji, S. (2006). Causes of delay in large construction projects. International journal of project management, 24(4), 349-357.

ASHE 2014, American Society for Healthcare Engineering, Available from: < http://www.ashe.org/>. [15 October 2014].

Barrett, The Honors College 2014, Arizona State University, Available from: < http://barretthonors.asu.edu/>. [30 June 2013].

Bernstein, HM. 2003, 'Measuring Productivity: An Industry Challenge', *Civil Engineering—ASCE* vol. 7, no. 12, pp. 46-53.

BVA 2014, Best Value Academy, Available from: < http://bestvalueacademy.com/>. [15 January 2014].

Chikuni, A & Hendrik P 2012, 'The Impact of Procurement Systems on the Outcome of Public Projects', Presented at *RICS COBRA 2012*, Las Vegas, NV.

Chong, N., Sullivan, K., Sullivan, M., and Kashiwagi, D. T. (2007). "The Cultural Revolution." Naval Postgraduate School (NPS) 4th Acquisition Research Symposium, Monterey, CA, May 17, 2007.

CIB World 2014, International Council for Research and Innovation in Building and Construction, Available from: < http://www.cibworld.nl/site/home/index.html>. [1 October 2014].

CII 2014, Construction Industry Institute, Available from: < https://www.construction-institute.org/scriptcontent/index.cfm>. [3 August 2014].

Cioara, J., Romero, S., Kashiwagi, D., & Sullivan, K. (2014). "The Transformation of a Construction Contracts Administration Class." The American Society for Engineering Education (ASEE) 121st Annual Conference, Indianapolis, Indiana (June 15-18, 2014).

COASS 2014, Construction Owners Association of America, Available from: < https://www.coaa.org/#&panel1-4>. [5 July 2014].

Deming, EW 1982, *Out of the Crisis*, Massachusetts Institute of Technology, Cambridge.

D'Este, C. (1996). Patton: A Genius for War, Harper Perennial, New York, NY. Publisher: HarperCollins., 1995.

Dudovskiy, John (2014). "An Ultimate Guide to Writing a Dissertation in Business Studies: A Step by Step Assistance." Research Methodologies

Duren JV, & Doree, A 2008, 'An Evaluation of Performance Information Procurement System', *Proceedings of the 3rd International Public Procurement Conference*, PIPS, Amsterdam, Netherlands, pp. 1-24.

Dul, J & Hak T 2008, *Case Study Methodology in Business Research*, Elsevier Ltd, Netherlands.

Egan, SJ 1998, 'Rethinking Construction: The Report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the scope for improving the quality and efficiency of UK construction.', *The Department of Trade and Industry*, London.

Egbu, C., Carey, B., Sullivan, K & Kashiwagi, D 2008, *Identification of the Use and Impact of Performance Information Within the Construction Industry Rep*, The International Council for Research and Innovation in Building and Construction, AZ.

Georgy, ME., Change, L & Lei Z 2005, 'Engineering Performance in the US Industrial Sector', *Cost Engineering*, vol. 47, no. 1.

Goodridge, S., Kashiwagi, D.T., Ahmed, S. and Sullivan, K. (2006) "Case Study: Best Value Procurement at Baptist Hospital South Florida" Symposium on Sustainability and Value through Construction Procurement 2006, CIB W092-Procurement Systems, Digital World Center Salford, UK pp. 206-217 (November 29, 2006).

Hsieh, T. Y., Lu, S. T., & Wu, C. H. (2004). Statistical analysis of causes for change orders in metropolitan public works. International Journal of Project Management, 22(8), 679-686.

Horman, M. & Kenley, R. (2005) "Quantifying levels of wasted time in construction with meta-analysis.‖ Journal of Construction Engineering and Management, ASCE. 131, Issue 1, 52-61.

IFMA 2014, International Facility Managers Association, Available from: < http://www.ifma.org/>. [5 October 2014].

Impact Analysis. (2004). "The Impact of Academic Research on Industrial Performance" Research Technology Management, Vol. 47 (2), 63-64.

Kashiwagi, D. (1991). Development of a Performance Based Design/Procurement System for Nonstructural Facility System. Dissertation in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy, Arizona State University.

Kashiwagi, D. T. and Badger, W. W. (1991) "Job Order Contracting: A New Contracting Technique for Maintenance and Repair of Construction Projects." Cost Engineering, 33 (3) pp. 21-24, March.

Kashiwagi, D.T. (1995) "Using Fuzzy Logic and the Management of Information to Increase the Performance of Construction Systems" Associated Schools of Construction: Proceedings of the 31st Annual Conference; Tempe, AZ, pp. 211-217 (April 6, 1995).

Kashiwagi, D.T. and Moor, W.C. (1995) "Application of Backward Chaining, "Fuzzy Logic," and the Management of Information to Procurement of Facility Systems/Services" 17th International Conference on Computers and Industrial Engineering: Future Challenges for Industrial Engineering; Phoenix, AZ, pp. 399-403 (March 5, 1995).

Kashiwagi, D. T., Halmrast, C. T. and Tisthammer, T. (1996) "Intelligent Procurement of Construction Systems." Journal of Construction Procurement, 2 (1) pp. 56-65, May.

Kashiwagi, D. T. and Al-Sharmani, Z. (1999) “Development of the Job Order Contracting (JOC) Process for the 21st Century.” Journal of Construction Education, 3 (2) pp. 195-203, May.

Kashiwagi, D. T. and Mayo, R. E. (2001a) “State of Hawaii Selects "Best Value" by Artificial Intelligence.” Cost Engineering, 43 (4) pp. 38-44, April.

Kashiwagi, D.T. and Mayo, R.E. (2001b) "Procurement of Construction in the 21st Century" COBRA 2001, Vol. 2; Glasgow University with the RICS Research Foundation, Glasgow, Scotland, Vol. 2, pp. 535-545 (September 5, 2001).

Kashiwagi, D. T., (2002) “Documented Performance of the JOC Construction Delivery System (1994-1998).” Cost Engineering, 44 (6) pp.14-20, June.

Kashiwagi, D.T. and Byfield, R. (2002a) "Case Studies of the State of Hawaii and Utah Implementation of Performance Based Contracting" COBRA 2002 - Construction and Building Research Conference, Notting ham Trent University, UK; Vol. 1, pp. 297-309 (September 5, 2009).

Kashiwagi, D. T. and Byfield, R. (2002b) “Case Study of Potential Impact of Subjective Decision Making on Construction Performance.” Journal of Construction Procurement, 8 (2) pp.101-116, November.

Kashiwagi, D. T. and Byfield, R. (2002c) “State of Utah Performance Information Procurement System Tests.” ASCE: Journal of Construction Engineering and Management, 128 (4) pp. 338-347, July.

Kashiwagi, D. T. and Byfield, R. (2002d) “Testing of Minimization of "Subjectivity" in Best Value Procurement by Using Artificial Intelligence Systems in the State of Utah Procurement.” ASCE: Journal of Construction Engineering and Management, 128 (6) pp.496-50.

Kashiwagi, D.T. and Mohammed, M. (2002) "A Study Comparing US Construction Delivery Systems Based on Business and Management Principles" COBRA 2002 - Construction and Building Research Conference, Notting ham Trent University, UK; Vol. 1 pp. September 5, 2002).

Kashiwagi, D.T., Savicky, J. and Kashiwagi, A. (2002) "Analysis of the Performance of 'Best Value' Procurement in the State of Hawaii" ASC Proceedings of the 38th Annual Conference Virginia Polytechnic Institute and State University - Blacksburg, Virginia, pp. 373-380 (April 11, 2002).

Kashiwagi, D.T. and Savicky, J. (2002a) "Resistance to Best Value Procurement in the Construction Industry" W65 - CIB 2002 10th International Symposium; Cincinnati, OH; Vol. 2, pp. 788-798 (September 10, 2002).

Kashiwagi, D.T. and Savicky, J. (2002b) "The Impact of Information on the Construction Industry Structure" W65 - CIB 2002 10th International Symposium; Cincinnati, OH; Vol. 1, pp.670-679 (September 9, 2002).

Kashiwagi, D.T. and Savicky, J. (2002c) "The Relationship between the Specification, Low-Bid Process and Construction Nonperformance" First International Conference on Construction in the 21st Century; Miami, FL pp. 371-377 (April 25, 2002).

Kashiwagi, D.T. and Savicky, J. (2003) "Case Study of the Implementation of the Performance Information Procurement System at the Dallas Independence School District" Associated Schools of Construction, International Proceedings of the 39th Annual Conference Clemson, SC, pp. 315-323 (February 10, 2003).

Kashiwagi, D.T., Savicky, J. and Parmar, D. (2003a) "Case Study of the Dallas Independent School District's Construction Value" Association of Researchers in Construction Management (ARCOM) 19th Annual Conference, University of Brighton, UK, Vol. 1, pp13-21 (September 3, 2003).

Kashiwagi, D.T., Savicky, J. and Parmar, D. (2003b) "Case Study of the University of Hawaii Implementation of Performance Based Procurement" Joint International Symposium of CIB Working Commissions: W55 Building Economics, W65 Organization & Management of Construction, W107 Construction in Developing Countries; Singapore, Vol. 1, pp.395-402 (October 22, 2003).

Kashiwagi, D. T., Parmar, D. and Savicky, J. (2003c) "The Impact of Minimizing Specifications and Management at the University of Hawaii." Journal of Facilities Management, 2 (2) pp. 131-141, September.

Kashiwagi, D.T., Chong, N., Costilla, M., McMenimen, F. and Egbu, C. (2004a) "Impact of Six Sigma on Construction Performance" Association of Researchers in Construction Management (ARCOM) 20th Annual Conference Heriot Watt University, Edinburgh, UK pp. 13-23 (September 1, 2004).

Kashiwagi, D.T., Koebergen, H. and Egbu, C. (2004b) "Construction Nonperformance is a Process Problem" COBRA 2004 - Construction and Building Research Conference, Leeds Metropolitan University, Thorpe Park, Leeds, UK. CD-T2 (September 7, 2004).

Kashiwagi, D.T., Sullivan, K. and Badger, W. (2006) "Future Research Model of the New University" International Conference in the Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 463-473 (June 13, 2006).

Kashiwagi J., Kashiwagi, D. T., and Sullivan, K (2007), "Refining the Supply Chain: Schering Plough Procurement of Facility Services." Journal of Construction Procurement, 13 (2) pp.99-107, November.

Kashiwagi, D. T., Sullivan, K., and Savicky, J. (2008a), "Case Study of Sustainability of the PIPS Best Value Program at the University of Minnesota." Journal for the Advancement of Performance Information and Value, 1 (1) pp. 73-82, June.

Kashiwagi, D., Sullivan, K. and Badger, W. (2008b) "Case Study of a New Construction Research Model" ASC International Proceedings of the 44th Annual Conference, Auburn University, Auburn, AL, USA, CD-4:2 (April 2, 2008).

Kashiwagi, J. and Kashiwagi, D. (2009) "New Role of Construction Manager/Client Engineer/Quantity Surveyor" RICS COBRA Research Conference, University of Cape Town, pp. 763-774 (September 10-11, 2009).

Kashiwagi, J., Kashiwagi, D. T., and Sullivan, K. (2009a) "Graduate Education Research Model of the Future" 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, CD-Day 2, Session E-4 (November 3-5, 2009).

Kashiwagi, J., Malhotra, N., Luna, E., Kashiwagi, D., and Sullivan, K. (2009b) "Creating Organizational Change: Minimizing Client Generated Construction Inefficiencies at the US Army Medical Command" Construction Research Congress (CRC) Conference Seattle, WA April 5-7, 2009 pp. 370-379 (April 5-7, 2009).

Kashiwagi, J., Smithwick, J., Sullivan, K. and Kashiwagi, D. (2009c) "Neogard: The History and Formation of a Best Value Manufacturer" 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, CD-Day 2, Session E-5 (November 3-5, 2009).

Kashiwagi, J., Sullivan, K., and Kashiwagi, D.T. (2009d), "Risk Management System Implemented at the US Army Medical Command." Journal of Facilities Management, 7(3) pp.224-245.

Kashiwagi, D., Savicky, J., and Sullivan, K. (2010a) "Strategic Plan for the Implementation of a New PM Model." Fifth Scientific Conference on Project Management (PM-05) - Advancing Project Management for the 21st Century, Concepts, Tools & Techniques for Managing Successful Projects, Heraklion, Crete, Greece, pp. (May 29-31, 2010).

Kashiwagi, D., Smithwick, J., Kashiwagi, J., and Sullivan, K. (2010b) “Case Study of a Best Value Manufacturer.” Journal for the Advancement of Performance Information and Value, Vol. 2 (1), pp. 57-86.

Kashiwagi, D. T. (2011). “Project Management Model of the Future: Aligning Expertise Instead of the Managing and Controlling.” 5th Annual Project Management Symposium, University of Texas at Dallas, Dallas, TX, August 11-12, 2011.

Kashiwagi, D., and Kashiwagi, J. (2011) “Case Study: Performance Information Procurement System (PIPS) in the Netherlands.” Malaysian Construction Research Journal (MCRJ), Construction Research Institute of Malaysia (CREAM), Vol. 8 (1), pp. 1-17.

Kashiwagi, J., and Kashiwagi, D. (2011a) “Solving the Malaysian Construction Industry Research Environment.” Sixth International Conference on Construction in the 21st Century (CITC VI), Kuala Lumpur, Malaysia (July 5-7, 2011).

Kashiwagi, J., and Kashiwagi, D. (2011b) “Best Value PIPS Research Reaches Malaysia.” Sixth International Conference on Construction in the 21st Century (CITC VI), Kuala Lumpur, Malaysia (July 5-7, 2011).

Kashiwagi, D., Kashiwagi, J., Kashiwagi, A., and Sullivan, K. (2012a) “The Research Model that Revolutionized the Dutch Construction Industry.” Journal for the Advancement of Performance Information and Value, Vol. 4 (2), pp. 133-146.

Kashiwagi, D, Kashiwagi, J, Rijt, J., Santema, S. (2012b). The Best Value Approach in the Netherlands: A Reflection on Past, Present, and Future, PBSRG 2012 Journal for the Advancement of Performance Information and Value VOL. 4 NO. 2.

Kashiwagi, J. and Morrison, J. (2012). “Minimizing Protests through a Transparent Selection Process.” RICS COBRA Conference 2012, Las Vegas, NV, USA (September 11-13, 2012).

Kashiwagi, D., and Kashiwagi, J. (2013) “Dutch Best Value Effort.” RICS COBRA Conference 2013, New Delhi, India, pp. 349-356 (September 10-12, 2013).

Kashiwagi, D., Kashiwagi, A., Kashiwagi, I. (2013a) “Challenges to Apply Best Value in Malaysia Construction Industry.” ISEC-7, Honolulu, HI, USA pp. (June 18-23, 2013).

Kashiwagi, D., Kashiwagi, J., Kashiwagi, A., Sullivan, K. (2013b) “The Solution Behind the Revolutionizing of the Dutch Construction Industry.” ISEC-7, Honolulu, HI, USA pp. (June 18-23, 2013).

Kashiwagi, J. (2013). Dissertation. “Factors of Success in Performance Information Procurement System / Performance Information Risk Management System.” Delft University, Netherlands.

Kashiwagi, D. (2014). The Best Value Standard, Performance Based Studies Research Group, Tempe, AZ. Publisher: KSM Inc., 2012.

Kenny, R. (2000). Master’s Thesis. “Implementation of the Performance Information Procurement System within the State of Hawaii for Roofing Projects.”

Latham, M., 1994, *Constructing the team*, HMSO, London.

Lee, S-H., Diekmann, J., Songer, A. & Brown, H. (1999). ―Identifying waste: Applications of construction process analysis.‖ Proceedings of the 9th IGLC Conference. Berkeley, USA .

Lepatner, B.B. 2007, *Broken Buildings, Busted Budgets*, The University of Chicago Press, Chicago.

Lo, T. Y., Fung, I. W., & Tung, K. C. (2006). Construction delays in Hong Kong civil engineering projects. Journal of Construction Engineering and Management, 132(6), 636-649.

Meyer, J., Witt, S., Kashiwagi, D., and Kashiwagi, J. (2010). “General Services Administration Streamlines the Procurement of Construction Services.” 7th Annual Acquisition Research Symposium, Monterey, CA, May 11-13, 2010.

Meyer, J., Witt, S., Kashiwagi, J., and Kashiwagi, D. (2011) “General Services Administration Tests the Best Value PIPS Paradigm.” Malaysian Construction Research Journal (MCRJ), Construction Research Institute of Malaysia (CREAM), Vol. 8 (1), pp. 18-36.

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).

Mahamid, I., Bruland, A., & Dmaidi, N. (2011). Causes of delay in road construction projects. Journal of Management in Engineering, 28(3), 300-310.

NIGP 2014, National Institute of Governmental Purchasing, Available from: < http://www.nigp.org/eweb/StartPage.aspx>. [6 May 2014].

Nihas, S., Barlish, K., Kashiwagi, J., and Kashiwagi, D. (2013). “An Analysis of Construction Industry Structure in India.” Journal for the Advancement of Performance Information and Value, Vol. 5 (2), pp. 166-179.

Ntshwene, K., Kashiwagi, J., Sullivan, K. and Kashiwagi, D. T., (2009) "Sustainable Research Platform at the University of Botswana" RICS COBRA Research Conference, University of Cape Town, pp. 332-343 (September 10-11, 2009).

NSF 2014, National Science Foundation, Available from: < http://www.nsf.gov/>. [25 August 2014].

PMI 2014, Project Management Institute, Available from: < http://www.pmi.org/>. [1 November 2014].

PBSRG (2014). Performance Based Studies Research Group. Retrieved February 23, 2013 from PBSRG Web site: http://pbsrg.com/overview/documented-performance/

PBSRG 2014 *About Performance Based Studies Research Group*, Arizona State University, Available from: <http://www.pbsrg.com/about/>.

Oyedele, L.O., Regan, M., von Meding, Arinola, J., Olawale, K., Spillane, J. & Konanahalli, A., ‘Strategies for Reducing Construction Waste to Landfill in the UK’, Presented at *RICS COBRA 2012*, [10-13 September 2012].

Odeh, A., and Battaineh, H. (2002). “Causes of Construction Delay: Traditional Contracts” International Journal of Project Management, Vol. 21 (1), 67-73.

SKEMA 2014, SKEMA Business School, Available from: < http://www.skema-bs.fr/>. [5 July 2014].

State of Hawaii PIPS Advisory Committee 2002, *Report for Senate Concurrent Resolution No. 39 Requesting a Review of the Performance Information Procurement System (PIPS)*, Honolulu, HI: U.S. Government, Available from: <http://hawaii.gov/dags/rpts/pips.pdf>.

Sullivan, K., Kashiwagi, M. and Kashiwagi, D.T. (2005) "Transforming the MEDCOM Facilities/Construction Management Environment into an Information

Environment" ASC International Proceedings of the 41st Annual Conference, University of Cincinnati, Ohio CD-T6 (April 6, 2005).

Sullivan, K., Kashiwagi, D.T., Koebergen, H. and Zenko, D. (2006) "Bridging the Gap: Performance and Efficiency in Design Build Delivery" ASC International Proceedings of the 42nd Annual Conference Colorado State University, Fort Collins, CO CD-T20 (April 19, 2006).

Sullivan, K., Kashiwagi, D., Brown, D. and Kashiwagi, J. (2007) "Best Value Process in the Selection of Software Services" Fourth International Conference on Construction in the 21st Century (CITC-IV): Accelerating Innovation in Engineering, Management, and Technology, Gold Coast, Australia, CD-T15 (July. 11, 2007).

Sullivan, K., Kashiwagi, D. T., and Chong, N. (2009), "The Influence of an Information Environment on a Construction Organization's Culture: A Case Study." Advances in Civil Engineering, Vol. 2009, Article ID 387608, 10 pages.

Sullivan, K., Savicky, J., and Carey, B. (2010). "Best-Value Process Implementation at the City of Peoria: Five Years of Research Testing." Journal for the Advancement of Performance Information and Value, Vol. 2 (1), pp. 23-32.

Rijt, J. and Witteveen, W. (2011). Contractor selection using BVP in the construction industry Case studies at the Dutch Ministry of Infrastructure, Ipsera Conference Proceedings Maastricht, 1398-1404.

Rivera, A. (2013). Undergraduate Honors Thesis, B.S. "Utilization of Deductive Logic and Leadership Concepts: A Best Value Approach to Education." Arizona State University.

Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. International Journal of project management, 25(5), 517-526.

Santema, S. (2011). What is happening in supply chain management? From push to pull through best value thinking. Journal for the Advancement of Performance Information and Value, 3(1), 46-54.

Smithwick, J. and Kashiwagi, D. (2012) "Best Value System Documents Performance of City's Public Works Department Projects." RICS COBRA Conference 2012, Las Vegas, NV, USA pp. 1833-1840 (September 11-13, 2012).

Strategic Direction. (2005) "Innovation frustration: Lacking management and metrics", Strategic Direction, Vol. 21 Iss: 11, pp.36 – 37

Thomas, H. R., & Napolitan, C. L. (1995). Quantitative effects of construction changes on labor productivity. Journal of construction engineering and management, 121(3), 290-296.

UK Construction Industry KPIs - Industry Performance Report 2011, '2011 Industry Performance Report, Based on the UK Construction Industry Key Performance Indicators', pp. 1-30.

Wearden, Graeme (2008, April, 17). OFT accuses construction firms of price rigging.guardian. co.uk, URL http://www.guardian.co.uk/business/2008/apr/17/construction.carillion business (visited 2009, January).

Whitaker, Diana (2006) *Hospital construction continues.* Daily Bruin Contributor, July.

Witteveen, W. and Rijt, J. (2013). “Possible Barriers to a Successful Further Diffusion of the Best Value Approach in the Netherlands: Observations of Major Misunderstandings on the Concept and Theory” Journal for the Advancement of Performance Information and Value, Vol. 5 (2).

Zaghloui, R., and Hartman, F. (2003). “Construction Contracts: The Cost of Mistrust” International Journal of Project Management, Vol. 21 (6), 419-424.

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

APPENDIX A

PERFORMANCE BASED STUDIES RESEARCH GROUP (PBSRG) STRATEGIC PLANS

The Performance Based Studies Research Group (PBSRG) had six major strategic plans from 1993 – 2014.

Strategic plan 1 [1993: Creation of PBSRG] (Kashiwagi, et al., 2008b)**:**

1. Become world leader in best value delivery in construction.
2. Concentrate on testing best value approach hypothesis to determine new advancements to approach, than testing current industry concepts that were not supported with testing results.
3. Only use deductive logic models instead of MDC models that were identified in Dean Kashiwagi's dissertation that did not lead to efficiency.
4. Only seek operational funding from industry clients, who could use the research to add value to their operations.
5. Continue to modify the strategic plan.

Strategic plan 2 [1994 - 1998: Phase I of best value approach] (Kashiwagi, 2014)**:**

1. Convince clients to hire high performing contractors instead of low bid contractors.
2. Identify that high performing contractors would be able to deliver projects faster, because the specifications could be minimized, and clients would receive much better performance.

Strategic plan 3 [1999 - 2004: Phase II of best value approach] (Kashiwagi, 2014):

1. Begin testing best value PIPS on new and large construction projects.
2. Identify new advancements, and then adjust approach to become more efficient and effective.

Strategic plan 4 [2005 - 2008: Phase III of Best value approach] (Kashiwagi, 2014)**:**

1. Change procurement system of owner.
2. Shift from focus of technical expertise of contractor to procurement delivery method only.
3. Shift from procurement of only construction to all industries.

Strategic plan 5 [2008 - 2011: Phase IV of best value approach] (Kashiwagi, 2014)**:**

1. Best value approach is no longer under major development.
2. Mature the best value approach PIPS/PIRMS process.

3. Change project management model.
4. Shift focus to project management and clarification phase of best value approach.

Strategic plan 6 [2011 - 2014: Phase V of best value approach] (Kashiwagi, 2014)**:**

1. Change paradigm of traditional thinking.
2. Change industry paradigm by using an education model to increase capability of industry expert.
3. Get industry to understand IMT education is required.
4. Use education results to support model for paradigm change in industry.
5. Educate industry with new mentoring model to assist blind to see without MDC.
6. Teach people how to think five times faster, using deductive logic and common sense.
7. Enter Norway, which is the second European country PBSRG will enter.
8. Once in Norway, expose best value approach to willing visionary European countries and attempt to partner with major organizations and run tests.
9. After Europe, attempt Africa once again, and finally expose its real problem with the banking industry.
10. Begin to reach out to visionary geographically separated countries and groups that are in silos.
11. Concentrate on information and communications technology (ICT), medical area, and professional engineering services.
12. Continue to support Dutch movement of best value PIPS.
13. Continually brief all major procurement and project management silos [NIGP, IPM, PMI].
14. Educate geographically separated countries and professional groups, how to remove complexity by utilization of expertise and metrics.
15. Integrate all PBSRG visionary efforts on one web platform [see Appendix F].
    a. Capture all presentations, papers, and efforts of PBSRG visionaries.
16. Use PBSRG.com to put efforts on the internet immediately.
    a. All projects must have weekly risk reports (WRR) and directors reports if required.
17. India/Saudi Arabia Effort
    - Use Facilities Management program at the Del E Webb School of Construction at Arizona State University to use as a platform for marketing best value to students and industry partners.
    - Identify students for research support.
    - Objective is to identify and document PBSRG similar worldwide efforts.
    - Students are vehicles for the reach of best value to extend within both countries.
    - Students will identify visionary universities and industry research clients, to run tests and expose more people to best value.
18. K-12 (Barrett Summer Scholars) & higher education:
    - Expose PBSRG research to more students, parents, and professionals through the BSS, FM, and Honors programs.
    - Use ASU student leadership organization, sponsored by PBSRG, as a vehicle to expand the professional network.

- Continue to improve teaching skills.
- Document case studies of students who have changed their lives using the best value education.

APPENDIX B

PROFESSIONAL ORGANIZATIONS/BRIEFINGS

The Performance Based Studies Research Group (PBSRG) has been active in professional memberships and committees for over twenty years. The professional organizations are the major sources of PBSRG's industry research clients by up to 95%. PBSRG briefs many of the professional organizations each year, exposing countless professionals to the best value approach, which often begins a research partnership to conduct prototype testing on the best value theoretical model. One of PBSRG's most beneficial memberships was the International Facilities Management Association (IFMA). In 2005, IFMA began working with PBSRG to create the first best value master's degree program at the Del E Webb School of Construction at Arizona State University (PBSRG, 2014).

The Performance Based Studies Research Group (PBSRG) has the following (PBSRG, 2014) (PBSRG, 2014):

- Professional Memberships (6)
- National/International Memberships (3)
- Invited National/International Meetings (85)
- Conference Presentations (73)
- Local Invitations (11)
- General Presentations (104)

Professional Associations Major Functions:

- Expose best value approach through conferences [Industry & Academic].
- Main source of meeting research clients.

Most Significant Professional Associations (prioritized greatest to least):

1. International Facility Management Association (IFMA) – Graduate Program; CFPB; Canada; ISD 287; General Dynamics.
2. National Institute of Governmental Purchasing (NIGP) – States of Oklahoma, Idaho, & Alaska; ADEQ; Polk County; New York Port Authority.
3. Project Management Institute (PMI) – SRP; ASU; Canada.
4. Neogard Alpha Program – First time to start industry presentations; FAA; State of Hawaii.
5. American Society of Healthcare Engineering (ASHE) – MEDCOM.
6. Construction Owners of America (COA) – City of Peoria.
7. National Facilities Management and Technology (NFMT) – State of Oregon.
8. SKEMA Business School - Netherlands
9. Institute of Supply Management Academician (ISM) – Potential clients.
10. International Council for Research and Innovation in Building and Construction (CIB) – PBSRG Journal.

Professional Memberships (11):

1. 1983 – 2004: Institute of Industrial Engineers
2. 1983 – 1998/2004 – Present: Construction Institute
3. 1983 – Present: Arizona State University Alumni Association
4. 1984 – Present: American Society of Civil Engineering
5. 1992 – 2004: National Roofing Contractors Association
6. 2000 – Present: International Facility Managers Association (IFMA), Greater Phoenix Chapter – Educational
7. 2000 – 2001: Building Owners and Managers Association
8. 2001 – 2004: The Association for the Advancement of Cost Engineering
9. 2004 – Present: Institute of Supply Management Academician
10. 2005 – Present: International Council for Research and Innovation in Building and Construction (CIB)
11. 2006 – Present: Project Management Institute

Member of National or International Committees (5):

1. 1994 – 2002: Academic Chair, Center for Job Order Contracting Excellence
2. 1994 – 2002: Member, Alliance Construction Excellence
3. 2003 – Present: Education/Faculty Advisor, Greater Phoenix Chapter of IFMA
4. 2004 – Present: Facilities Management Research Institute
5. 2004 – Present: Education Director of the Facilities Management Research Institute (FMRI)

Invited National or International Meetings (85):

1. "Procurement Assessment/Risk Identification." 2007 National Association of Educational Procurement (NAEP) District VI Meeting and Product Exhibit, Coeur d'Alene, ID, October 8, 2007.
2. "What is Best Value Contracting?" University of New Mexico, Facilities Management pt. Meeting, Albuquerque, NM, April 30, 2010.
3. "Crossroads: the Transformation and Survival of the Facility." IFMA Seattle Chapter Meeting, Seattle, WA; June 18, 2010.
4. "Project Management (PM) Model for the Future." University Sains Malaysia, Construction Management External Examiner Meeting, Pusat Pengajian Malaysia, June 28, 2010.
5. "Best Value Procurement." Brazos County Purchasing Department, Bryan, TX, December 7, 2011 (1:15 PM – 4:00 PM).
6. Best Value Procurement." Texas A&M University, College Station, TX, December 7, 2011 (9:00 AM – 10:30 AM).
7. "Best Value Procurement." University of Texas-Austin, Austin, TX, December 6, 2011 (3:45 PM – 4:30 PM).

8. "Best Value Procurement." Council of Educational Facility Planners International (CEFPI) Monthly Meeting, Austin, TX, December 6, 2011 (2:00 PM – 3:00 PM).
9. "Best Value Procurement." State of New Mexico Procurement Meeting, Santa Fe, NM, November 22-23, 2011.
10. "Performance Based Contracting." National Academies-Meeting of Experts, Baltimore, MD, September 19, 2011.
11. “Managing Risk and Delivering Value: A Closer Look at Best Value.” Design-Build Institute of America Mid-American Region 2011 Summer Education Program, Overland Park, KS, July 20-21, 2011.
12. "Best Value Performance by Early Contractor Involvement." Early Contractor Involvement, London, England, June 23, 2011.
13. "Facility Engineer of Tomorrow." Central New York Society for Healthcare Engineering Monthly Meeting, Syracuse, NY, June 9, 2011.
14. "The New QS Paradigm: Be Proactive to Add Value Instead of Being Reactive." Royal Institution of Surveyors Malaysia, Grand Dorsett Hotel, Subang Jaya, Selangor, Malaysia, November 8, 2012.
15. “Increasing the Value and Professionalism of Engineers.” The Institution of Engineers Malaysia, Wisma IEM, Petaling Jaya, Selangor, Malaysia, November 7, 2012.
16. "The FM of Today versus the FM of Tomorrow." FM Day in Central PA, Central Pennsylvania Chapter of International Facilities Management Association (IFMA), The Conference Center at Central Penn College, Summerdale, PA October 17, 2012.
17. "The Role of FM, Designers, and Professionals Delivering Services in the Future." International Facilities Management Association New York City Chapter Monthly Meeting, Scandinavia House, New York, New York, October 16. 2012.
18. “New Project and Risk Management Paradigm.” PMI Malaysia Chapter Meeting, Kuala Lumpar, Malaysia, July 10, 2012.
19. "Best Value 'Type A', NEVI Meeting." NEVI Noord & NEVI Oost Congres, Amsterdam, Netherlands, May 9, 2012.
20. "The FM of Today versus the FM of Tomorrow." New Jersey Chapter of International Facility Managers Association Monthly Meeting, Summit, NJ, April 18, 2012.
21. "New Project Management Model." Project Management Center For Excellence Meeting, University of Maryland, College Park, MD, March 13, 2012.
22. “Best Value Approach in India.” Mantri Group, Bangalore, India, December 6, 2013 (4:00 PM – 6:00 PM).
23. “Introduction to Best Value Model.” Civil Aid Technologies, Bangalore, India, December 4, 2013 (11:30 AM – 1:00 PM).
24. “Best Value Model.” Total Environment Building System, Bangalore, India, December 3, 2013 (10:00 AM – 2:00 PM).
25. “Best Value Procurement.” Institute for Supply Management (ISM) Delaware Chapter, Wilmington, DE, October 2, 2013 (1:00PM – 4:00PM).

26. "The Leadership Approach in Supply Chain Management." Institute for Supply Management (ISM) SW Chapter, Las Vegas, NV, September 17, 2013 (7:30 AM – 8:30 AM).
27. "The Next Generation of Supply Chain Management." The Indian Railways - Indian Railways Institute of Logistics and Materials Management (IRILMM), New Delhi, India, September 9, 2013 (1:00 PM – 5:00 PM).
28. "The Next Generation of Supply Chain Management." Indian Institute of Technology, Delhi, (IIT-D), New Delhi, India, September 9, 2013 (10:00 AM – 12:00 PM).
29. "Outlook for the future – Best Value Performance Information Procurement System." Builders Association of India (BAI) and Association of Consulting Civil Engineers (ACCE), Chennai, Tamil Nadu, India, September 6, 2013 (6:00 PM – 10:00 PM).
30. "The Next Level of Efficiency in Project Delivery - BV PIPS." SRM University, Chennai, Tamil Nadu, India, September 6, 2013 (2:00 PM – 5:00 PM).
31. "The Next Level of Efficiency in Project Delivery - BV PIPS." Indian Institute of Technology -Madras (IIT-M), Chennai, Tamil Nadu, India, September 6, 2013 (9:00 AM – 12:00 PM).
32. "The Next Level of Efficiency in Project Delivery - BV PIPS." Consortium of Real Estate Developers Association of India (CREDAI), Pune, Maharashtra, India, September 5, 2013 (6:00 PM – 8:00 PM).
33. "The Next Level of Efficiency in Project Delivery - BV PIPS." National Institute of Construction Management and Research, Pune, Maharashtra, India, September 5, 2013 (10:00 AM – 3:00 PM).
34. "Outlook for the future – Best Value Performance Information Procurement System." Synergy Project Management and Consultancy, Bangalore, Karnataka, India, September 4, 2013 (3:00 PM – 5:00 PM).
35. "Outlook for the future – Best Value Performance Information Procurement System." Brigade Group, Bangalore, Karnataka, India, September 4, 2013 (12:00 PM – 2:00 PM).
36. "Outlook for the future – Best Value Performance Information Procurement System." Sobha Developers, Bangalore, Karnataka, India, September 4, 2013 (9:00 AM – 11:00 AM).
37. "Outlook for the future – Best Value Performance Information Procurement System." 'Association of Consulting Civil Engineers (ACCE) and Indian Concrete Institute (ICI)', Bangalore, Karnataka, India, September 3, 2013 (6:00 PM – 10:00 PM).
38. "Outlook for the future – Best Value Performance Information Procurement System." A.N Prakash Construction Project Management and Consultancy, Bangalore, Karnataka, India, September 3, 2013 (2:00 PM – 4:00 PM).
39. "The revolutionary business model – Best Value Performance Information Procurement System." Indian Institute of Science, Bangalore, Karnataka, India, September 3, 2013 (11:00 AM – 1:00 PM).

40. “Outlook for the future – Best Value Performance Information Procurement System.“ Consortium of Real Estate Developers Association of India (CREDAI), Mysore, Karnataka, India, September 2, 2013 (5:00 PM – 9:00 PM).
41. “The future of supply chain – Best Value Performance Information Procurement System.” The International Workshop on Construction Technology Management and Building Services, Sri Jayachamarajendra College of Engineering (SJCE), Mysore, Karnataka, India, September 2, 2013 (10:00 AM – 1:00 PM).
42. "Avoid the Knockout Instead Fight Back with Best Value." Rochester Area Builders Inc., Rochester, MN, August 7, 2013.
43. “The Best Value Approach.” Keynote address. Democratic Republic of the Congo Ministry, Kinshasa Gombe, DRC, Africa, July 23, 2013 (9:00 AM – 11:00 AM).
44. "Future FM and Real Estate Management Professional; Real Estate and Facility Management." International Facility Management Association (IFMA) Honolulu Chapter, Cupola Theatre at the Honolulu Design Center, Honolulu, HI, June 20, 2013 (11:30 AM – 1:00 PM).
45. "Risk Management: Don't Wait for the Glass Slipper to Drop." Project Management Institute (PMI) Honolulu Chapter, Honolulu, HI, June 19, 2013.
46. "Leadership Approach to Supply Chain Management." Institute for Supply Management (ISM) Honolulu Chapter, Hawaii Gas Training Room, Honolulu, HI, June 18, 2013.
47. "The Future FM and Professional with Dr. Dean Kashiwagi." International Facilities Management Association (IFMA) Capital (DC) Chapter, the Institute for Defense Analyses (IDA), Alexandria, VA, June 11, 2013.
48. “Best Value Approach for Inga3.” Presentation for the Democratic Republic of Congo, Paris, France, June 3, 2013.
49. Best Value Congress." Keynote address at International Project Management Association (IPMA-NL) Conference, Amsterdam, Netherlands, May 29, 2013.
50. “Best Value PIPS.” Keynote address at Dutch National Best Value Congress. Delft University, Delft, Netherlands, May 28, 2013.
51. “Best Value Approach for Inga3.” Presentation for the Democratic Republic of Congo, Paris, France, May 17, 2013.
52. "Leadership Approach in Supply Chain Management." Supply Chain and Logistics Association of Australia (SCLAA), Queensland Cricketers Club, Brisbane, Queensland, Australia, May 7, 2013 (4:30 PM – 6:30 PM).
53. "Best Value Solution: Is there an End to Troubling Construction Projects.” CoreNet Global, Brisbane Chapter Boardroom Breakfast Series, Savills Boardroom, Brisbane, Australia, May 7, 2013 (7:00 AM – 9:00 AM).
54. "Next Generation Project Management Practices." Keynote address at International Project Management Association (IPMA-NL) Conference, Plattegrond Stands Sponsors & Supporters, Amsterdam, Netherlands, April 23, 2013 (11:00 AM – 12:30 PM).
55. “Best Value Procurement and Project/Risk Management.” Keynote address at Statkraft, Oslo, Norway, April 19, 2013.

56. “Best Value Approach to Service Delivery.” Keynote address at NIMA, Norwegian ISM Professional Group, Oslo, Norway, April 18, 2013.
57. "March IFMA Mastering Your Facilities: The Revolutionary Facilities Model of the Future." International Facility Management Association (IFMA) Orlando Chapter Workshop, Dubsdread Golf Club Ballroom, Orlando, FL, March 28, 2013.
58. “The New Paradigm of Delivering Services: The Best Value Approach.” Keynote address to China MOHORD Delegates, University of Maryland, College Park, MD, March 11, 2013.
59. "Best Value Strategy; Performance System Evaluation." Sintonia, Universidad Popular Autonoma del Estado de Puebla (UPAEP), Puebla, Mexico, February 27, 2013.
60. "The FM of Today vs. the FM of Tomorrow." International Facility's Management Association San Francisco Chapter Monthly Meeting, Office Pavilion CRI, San Francisco, CA, January 17, 2013.
61. "Best Value is the Practice of Responsible Procurement Professionals." 2014 National Institute of Government Purchasing (NIGP) Forum, Connecting Procurement Communities, Philadelphia, PA, August 24, 2014 (1:30 PM - 3:00 PM).
62. "Best Value Delivery Procurement Expert." 2014 National Institute of Government Purchasing (NIGP) Forum, Connecting Procurement Communities, Philadelphia, PA, August 24, 2014 (10:15 AM - 11:45 AM).
63. “Review of the Best Value Model.” State of Oklahoma, Central Purchasing, Oklahoma City, OK, June 19, 2014 (2:00 PM – 4:00 PM).
64. “Avoiding Risky Projects.” Project Management Institute (PMI) Oklahoma City Chapter, Oklahoma City, OK, June 19, 2014 (11:30 AM – 1:00 PM).
65. "Next Generation of Procurement & Facilities Management." Miami Dade College, Miami, FL, June 6, 2014 (10:00 AM – 11:30 AM).
66. “The Next Generation of Procurement.” Greater Orlando Aviation Authority, Orlando, FL, June 3, 2014 (3:00 PM – 4:30 PM).
67. "Best Value Basics." Keynote address at Best Value Congress 2014, Delft, Netherlands, May 19, 2014 (9:00 AM – 11:00 AM).
68. "Moving Facility Management from Good to Great." International Facility Management Association (IFMA) WNY Chapter, Rochester, NY, May 8, 2014 (8:30 AM – 4:00 PM).
69. "Survival of the Facility Manager." Keynote address at International Facility Management Association (IFMA) Wisconsin Tri-Chapter Symposium, Milwaukee, WI, May 1, 2014 (9:15 AM – 10:45 AM).
70. “The Best Value Approach.” Schuberg Philis, Amsterdam, Netherlands, April 25, 2014.
71. "Delivering Best Value." Dutch Government, Okura Hotel, Amsterdam, Netherlands, April 24, 2014.
72. "Best Value Procurement." Radgivende Ingeniorers Forening (RIF) / Advisory Engineers Association, Netherlands, April 22, 2014 (12:45 PM – 1:45 PM).

73. "Next Generation of Procurement & Facilities Management." Joint Seminar International Facility Management Association (IFMA) & Institute for Supply Management (ISM) Special Event, Fargo, ND, April 16, 2014 (8:00 AM – 4:30 PM).
74. "Best Value Contracting: Performance Based Delivery & Procurement of Services." Keynote address at Institute for Supply Management (ISM) Spring Seminar, UNO - Mammel Hall, Omaha, NE, April 10, 2014 (7:30 AM – 5:00 PM).
75. "Survival of the Building Owner/Property Manager." Keynote address at Building Owners and Managers Association International (BOMA) 2014 Southern Region Conference, Birmingham, AL, April 4, 2014 (12:00 PM – 2:00 PM).
76. "The Procurement Role of the Future." Keynote address at 2014 RMGPA Spring Conference, Rocky Mountain Governmental Purchasing Association (RMGPA), Aurora, CO, March 21, 2014 (9:45 AM – 11:15 AM).
77. "The Next Generation of Procurement & Facilities Management." City of Boulder, Facilities Dept., Boulder, CO, March 20, 2014 (1:00 PM – 2:30 PM).
78. "The Survival of the Facility Manager." International Facility Management Association (IFMA) Rocky Mountain Chapter, Loveland, CO, March 18, 2014 (11:30 AM – 1:00 PM).
79. "Best Value Procurement." University of California Berkeley and San Francisco, Procurement Dept., Berkeley, CA, March 13, 2014 (10:00 AM – 12:00 PM).
80. "The Survival of the Facility Manager." International Facility Management Association (IFMA) East Bay Chapter, San Ramon, CA March 12, 2014 (11:30 AM – 1:00 PM).
81. "The Importance of Owners Utilizing Expertise Instead of Managing, Directing and Controlling." Bay Area SMACNA Chapter, Oakland, CA, March 11, 2014 (11:00 AM –1:00 PM).
82. "Transparency: The Future of Facility Management." 2014 National Facilities Management and Technology (NFMT) Conference Program, Baltimore Convention Center, Baltimore, MD, March 4, 2014 (2:00 PM –2:50 PM).
83. "The Best Value Approach." Faulkner University, Montgomery, AL, February 6, 2014 (9:00 AM – 12:00 PM).
84. "The Survival of the Facility Manager." International Facility Management Association (IFMA) Birmingham Chapter, Birmingham, AL, February 5, 2014 (11:15 AM – 1:00 PM).
85. "The Survival of the Facility Manager." International Facility Management Association (IFMA) Atlanta, Atlanta, GA, February 4, 2014 (7:00 AM – 9:00 AM).

Conference Presentations (73):

1. "Process/Structure to Deliver Self-Regulated Best Value Services." National Association of College Auxiliary Services (NACAS) 39th Annual Conference, Las Vegas, NV, October 29, 2007.
2. "Revolutionary PM Model of the Future: A New Risk Management Model." Project Management Institute (PMI) Global Congress, Atlanta, GA, October 9, 2007.

3. "The Revolutionary Facilities Model of the Future: A New Risk Management Model." Council of Educational Facility Planners, International (CEFPI) 84th Annual International Conference, Toronto, ON, Canada, October 6, 2007.
4. "Curing Your Construction Ills by Implementing a Best Value Environment." Healthcare Facilities Symposium & Expo, Chicago, IL, October 2, 2007.
5. "Best Value - Are You Looking For It?" National Institute of Governmental Purchasing (NIGP) 62nd Annual Forum and Products Expo., Hartford, CT, August 8, 2007.
6. "Performance Based Systems Research." Naval Postgraduate School (NPS) SI4000 Summer AY2007 Systems Engineering Colloquium, Monterey, CA, August 2, 2007.
7. "Best Value Process in the Selection of Software Services.", "Transitioning to an Information Environment: Performance Research in Large Capital Projects and Facility Management Group", & "Motivating Contractor Performance Improvement through Measurement." CITCI Conference, Queensland, Australia, July 12 - July 13, 2007.
8. "Moving Forward with Best Value Procurement." National Association of College Auxiliary Services (NACAS) West 2007 35th Annual Conference, Edmonton, Alberta, June 4, 2007.
9. "The Cultural Revolution." Naval Postgraduate School (NPS) 4th Acquisition Research Symposium, Monterey, CA, May 17, 2007.
10. "The Revolutionary Facilities Model of the Future: A New Risk Management Model." Council of Educational Facility Planners, International (CEFPI) Southern Region Conference, San Antonio, TX, April 14, 2007, & April 15, 2007.
11. "Best Value Delivery of University Services." 40th Annual NACAS Conference, Chicago, IL, November 3, 2008.
12. "New Revolutionary Project Management Case Studies." PMI Global Congress 2008- North America, Denver, CO, October 21, 2008.
13. "Case Study: The Transformation of a Procurement Office", "A New Research Approach." RICS Construction and Building Research Conference, Dublin, Ireland, September 4, 2008.
14. "Procurement Breakthrough Technology: Shifting Risk and Control to the Vendors." National Institute of Government Purchasing (NIGP) 63rd Annual and Products Expo, Charlotte, NC, July 29, 2008.
15. "The Contract Management Model: Setting the Stage for Success." National Contract Management Association (NCMA) World Congress, Cincinnati, OH, April 16, 2008.
16. "The Best Value Model for Education: Can Everyone Win?" National School Plant Management Association (NSPMA) 13th Annual Conference, Nashville, TN, April 13, 2008.
17. "Breakthrough Technology: Best Value Performance Information Procurement System (PIPS)." & "Best Value Procurement/Delivery Case Study at Arizona State University." National Association of Education Procurement (NAEP) Conference, Austin, TX, April 8, 2008.

18. "General Contractors Role in Their Seat at the Construction Teams Table." & "The Facility Managers Role in the PDC." 2008 International Conference on Health Facility Planning, Design and Construction hosted by ASHE, Orlando, FL, March 11-12, 2008.
19. "The Facilities Manager Model: Setting the Stage for Success." National Facilities Management and Technology (NFM&T) Expo, Baltimore, MD, March 4, 2008.
20. "How to Get Innovative in Tough Times." 2009 National Association of College Auxiliary Services (NACAS) Annual Conference, Honolulu, HI; November 8-11, 2009.
21. "How Does Research Fix the Problems of the Construction Industry? By Maximizing Profit, Minimizing Cost, and Transferring Control and Risk Back to the High Performance Contractor." 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, November 3 - 5, 2009.
22. "Arizona State University Turns into a Measured, Outsourced, Optimal Facility." World Workplace 2009 Conference & Expo, International Facility Management Association, Orlando, FL, October 9, 2009.
23. "Project Management Boot camp and Delivery Survival Guide." CEFPI's 86th Annual World Conference & Expo, Washington, DC; September 27, 2009.
24. "Root of all evils: Misunderstanding of Construction Industry Structure" 5th International Structural Engineering and Construction Conference, Las Vegas, NV, September 23 - 25, 2009.
25. "Creating a High Performance Construction Environment Which Motivates Skilled Craftspeople/Trades." IPTW-ITES 2009, Denver, CO, August 24, 2009.
26. "How to Implement a Best Value Risk Management Model." 2009 International Conference and Exhibition on Health Facility Planning, Design and Construction, American Society for Healthcare Engineering (ASHE), Phoenix, AZ, March 9, 2009.
27. "Why Can't Professionals be More Professional and Increase Their Profit?" CONSTRUCT 2009 Conference, Indianapolis, IN, June 18, 2009.
28. "LEED Certification Without Risk: Buying Based Upon Proven Performance." FEFPA Winter Conference, Amelia Island, FL, January 28, 2009.
29. "Best Value Contracting." 2010 Cooperative Development Conference, Western States Contracting Alliance (WSCA), Albuquerque, NM, December 8, 2010.
30. "FM of Tomorrow." IFMA World Workplace 2010 Conference & Expo., Atlanta, Georgia; October 29, 2010.
31. "Reflections of Success." 2010 Rocky Mountain APPA Conference, Coeur d'Alene, Idaho; October 18 - 20, 2010.
32. "The Facilities Manager Model: Setting the Stage for Success." Building Operating Managements Facility Decisions Conference & Expo., Las Vegas, Nevada ; October 5 - 6, 2010.
33. "Enterprise Risk Management/ Efficiencies in Contractor Services." 2010 Materials Management Meeting, Whitefish, MT; September 29- October 1, 2010.

34. “Best Value Procurement” NEVI Nyenrode Congress 2010, Universiteit Nyenrode, the Netherlands, September 29, 2010.
35. "The Nuts and Bolts of Best Value Procurements for Services" & "Contracts that Minimize the Value of Services." National Institute of Governmental Purchasing (NIGP) 65th Annual Forum & Products Exposition, San Antonio, TX; August 15, 2010.
36. "Budget Cuts: Unlocking Innovation during Tough Times." NASFA National Conference & Expo, Burlington, Vermont; June 12-16, 2010.
37. "To Create Decision Support Systems or Replace Decision Making." IIE Conference & Expo, Cancun, Mexico; June 5-9, 2010.
38. "PM Model for the Future: PBPM Model." PM-05 Fifth Scientific Conference on Project Management, Heraklion, Crete, Greece; May 29 - 31, 2010.
39. "Managing Risk and Delivering Value- An Introduction to Best Value Procurement" & "Managing Risk and Delivering Value- A Closer Look at Best Value Procurement." Utility Supply Management Alliance (USMA): 15th Annual Educational Conference, San Antonio, TX; May 16-19, 2010.
40. "Overview of the Best Value Performance Information Procurement System (PIPS)." U.S. General Services Administration 2010 PBS Capital Construction Workshop, New Orleans, LA; May 11-13, 2010.
41. "How to Save Professionals and Increase Their Value and Professionalism." Construct 2010: 54th CSI Annual Convention, Philadelphia, PA; May 12-14, 2010.
42. "Increase Value during a Challenging Economy." "Work Smart + Ability to Change=Success." FAPPO 43rd Annual Conference and Vendor Trade Show: Leading the Way through an Economic Storm, Orlando, FL; May 2-5, 2010.
43. "The Facilities Manager Model: Setting up the Stage for Success." NFMT: Facilities Mexico 2010 Expo, Centro Banamex, Mexico; April 20-22, 2010.
44. "Crossroads: Moving from Low Bid to Proven Best Value System and Best Value MN Case Studies." International Facilities Managers Association: Twin Cities Symposium, Minneapolis, MN; April 7, 2010.
45. "Best Value Implementation and Changes." USAMRMC National Facility Management Conference, Baltimore, MD; March 15-19, 2010.
46. "Create Increased Value while Decreasing Costs." NFMT 2010 Conference, Baltimore, MD; March 16-18, 2010.
47. "Why Can't Professionals Be More Professional and Increase Their Profit?" American Society for Healthcare Engineering (ASHE) 2010 International Summit & Exhibition on Health Facility Planning, Design, and Construction (PDC). San Diego, CA; March 14-17, 2010.
48. "Historical Preservation Construction: What is the Problem?" Colorado Preservation Inc. Saving Places 2010: 13th Annual Preservation Conference, Denver, CO; February 3-5, 2010.
49. "Best Value Procurement." Kentucky School Plant Management Association 22nd Annual Conference, Lexington, KY, October 27, 2011.
50. "Best Value Procurement." National Association of State Procurement Officials 2011 Annual Conference, Austin, TX, September 13, 2011.

51. "The New Procurement/Contracting Role of the Future." National Institute of Government Purchasing (NIGP) 66th Annual and Products Expo, National Harbor, MD, August 26, 2011.
52. "A New Research Model, Impacting Industry Practice with Research Modeling/ Funding, Deductive vs. Inductive Approach." Special Eden Doctoral Seminar on Perspectives on Projects, Brussels, Belgium, August 19, 2011.
53. "Project Management Model of the Future: Aligning Expertise Instead of Managing and Controlling." Project Management Symposium University of Texas at Dallas, Dallas, TX, August 11, 2011.
54. "Best Value Procurement Theory." PIANO Conference, Amsterdam, Netherlands, May 26, 2011.
55. "Bringing Predictability and Efficiency to Failing Projects." Building Operating Management's National Facilities Management & Technology Conference & Expo, Baltimore, MD, March 15, 2011.
56. "The Future of Facility Management." Twin Cities Symposium, Minneapolis/St. Paul Chapter of International Facility Management Association, Minneapolis, MN, March 2, 2011.
57. "New Leadership Model: Changing the Playing Field." International Facilities Management Association's World Workplace 2012, The Facility Conference and Expo, Henry B. Gonzalez Convention Center, San Antonio, TX, November 17, 2012.
58. "The FM of Today versus the FM of Tomorrow." Building Operating Management's National Facilities Management and Technology Conference Vegas 2012, The Mirage, Las Vegas, NV, October 2, 2012.
59. "Best Value Procurement: de achtergronden en de methode." National Wegencongres, NBC Nieuwegein, Nieuwegein, Netherlands, September 26, 2012.
60. "How Industry Found the Researchers and Why They Continuously Participate." RICS COBRA 2012, Monte Carlo Resort, Las Vegas, NV, September 11-13, 2012.
61. "Best Value Procurement." National Congress of Risk Management Amsterdam, Ede, De Reehorst, Amsterdam, September 10, 2012.
62. "The Implementation of Best Value Research." EDEN Doctoral Seminar and ICCPM Research and Innovation Seminar 2012, SKEMA Business School, Lille, France, August 20, 2012.
63. "Vision and Future of the Construction Industry." 4th RICS-RISM International Surveying Conference for Undergraduates 2012, Kuala Lumpur, Malaysia, May 19, 2012.
64. "The Organization of the Future will Minimize Cost by 50%." Future Managers Summit, Istanbul, Turkey, April 27, 2012.
65. “Future of Project Management.” Association of Construction Project Managers Malaysia, Kelena Jaya, Malaysia, November 14, 2013 (2:30 PM – 4:30 PM).
66. "Best Value Performance by Early Contractor Involvement." International Association of Drilling Contractors (IADC) Forum on Early Contractor Involvement, Kuala Lumpur, Malaysia, November 14, 2013 (9:10 AM – 10:10 AM)

67. "Avoiding Risky Projects: A Closer Look at Value Based Contracting and Performance Measurements." International Facility Management Association (IFMA) Conference, Pennsylvania Convention Center, Philadelphia, PA, October 4, 2013.
68. "Transformation of the FM." National Facilities Management and Technology (NFMT) Vegas Conference, Las Vegas, Nevada, September 17, 2013 (11:00 AM – 11:50 AM).
69. "Revolutionary Procurement Expectation: Best Value - Lowest Cost." 68th National Institute of Government Purchasing (NIGP) Forum, Orlando, FL, August 25, 2013 (3:15 PM – 4:45 PM).
70. "Lessons Learned From Failed IT Procurement Projects." 68th National Institute of Government Purchasing (NIGP) Forum, Orlando, FL, August 25, 2013 (10:30 AM – 12:00 PM).
71. "Contractors Performance Measurement and Procurement: New Concepts and Best Practices from around the World." CIB W117 Special Workshop, Queensland University of Technology, Brisbane, Queensland, Australia, May 9, 2013 (2:30 PM – 4:00 PM).
72. "The 'New Business' of FM: Becoming a Value Add Leader." The National Facilities Management and Technology (NFMT) Show for Facilities Professionals Baltimore, Baltimore Convention Center, Baltimore, MD, March 13, 2013.
73. "Best Value Model for Procurement." Minnesota Multistate Contracting Alliance for Pharmacy (MMCAP) National Member Conference, Double Tree Hotel, Bloomington, MN, January 30, 2013.

Local Invitations (11);

1. "How to Implement Best Value Project Management Strategies." Arizona Public Service (APS) Company, Phoenix, AZ, April 5, 2007.
2. "PMI Effort with ASU: Defining the PM Model." PMI Phoenix Chapter, Phoenix, AZ, January 18, 2007.
3. "Best Value Contracting." KE&G Construction, Inc. Tucson, AZ, June 23, 2008.
4. “Why Can’t Professionals be More Professional and Increase their Profit?” Construction Specifies Institute (CSI) Phoenix Chapter, Phoenix, AZ, August 13, 2009.
5. "Managing Your Facility during a Challenging Economy." Great Phoenix Chapter of IFMA, Phoenix, AZ, August 12, 2009.
6. "Crossroads: Moving from Low Bid to Proven Best Value System and Best Value MN Case Studies." International Facilities Managers Association: Southwest Symposium, Phoenix, AZ; April 29, 2010.
7. "Avoiding Risky Projects: Don't Wait for the Glass to Drop." Project Management Institute (PMI) Phoenix Chapter, Phoenix, AZ, November 21, 2013.
8. "Avoiding Risky Projects: Don't Wait for the Glass to Drop." Project Management Institute (PMI) Phoenix Chapter, Scottsdale, AZ, November 20, 2013.

9. "The Leadership Approach in Supply Chain Management." Institute for Supply Management (ISM) Arizona Chapter, Phoenix, September 19, 2013 (6:45 PM – 8:00 PM).
10. "Survival of the Facility Manager." International Facility Management Association (IFMA) Phoenix, Phoenix, AZ, August 14, 2013 (11:30am to 1:00PM).
11. "Best Value Process." Leadership Society of Arizona (LSA), Memorial Union at Arizona State University, Tempe, AZ, April 1, 2014.

General Presentations (104):

1. Sullivan, K. (2011). Performance Measurement and Risk Management Approach for a Large Roofing Manufacturer and Installer. Tremco, Inc. January 11, 2011. Beachwood, Ohio.
2. Sullivan, K. (2011). A Best Value Approach to Facility Administration of Custodial Services. University of Alberta. January 19, 2011. Edmonton, Alberta, Canada.*
3. Sullivan, K. (2011). Best Value for Purchasing of Services. University of Alberta. January 19, 2011. Edmonton, Alberta, Canada.*
4. Sullivan, K. (2011). Document Management and Best Value. Salt River Project (SRP). February 7, 2011. Phoenix, Arizona.
5. Sullivan, K. (2011). Preplanning and Risk Management. ASU-PBSRG Annual Best Value Conference, Arizona State University. February 15, 2011. Tempe, Arizona.*
6. Sullivan, K. (2011). ASU Service Case Studies. ASU-PBSRG Annual Best Value Conference, Arizona State University. February 16, 2011. Tempe, Arizona.*
7. Sullivan, K. and Ferrin, P. (2011). Materials Recycling Facility Outsourcing and Best Value. City of Phoenix, AZ. March 8, 2011. Phoenix, Arizona.
8. Sullivan, K. (2011). Information Measurement Theory and Organizational Change. City of Phoenix, AZ. May 9, 2011. Phoenix, Arizona.
9. Sullivan, K. (2011). A Risk Management Value Proposition. Utility Supply Management Alliance (USAM) Annual Conference. May 24, 2011. Tampa Bay, Florida.*
10. Sullivan, K. (2011). Risk and Performance Measurement. Idaho Transportation Department. June 3, 2011. Boise, Idaho.
11. Sullivan, K. (2001). Best Value Business Model: Theory and Case Studies. Central Arizona Project (CAP). June 13, 2011. Phoenix, Arizona.
12. Sullivan, K. (2011). Preplanning and Project Control Methodologies. Alliance for Construction Excellence. June 14, 2011. Phoenix, Arizona
13. Sullivan, K. (2011). Productivity Management and Change Orders. Alliance for Construction Excellence. June 15, 2011. Phoenix, Arizona.
14. Sullivan, K. (2011). Procurement and the PMBOK. Alliance for Construction Excellence. June 20, 2011. Phoenix, Arizona.
15. Sullivan, K. (2011). Best Value Business Model within the Canadian Market. University of Alberta. June 28, 2011. Edmonton, Alberta, Canada.*
16. Sullivan, K. (2011). Integration of Preplanning, Risk, and Metrics into Custodial Services. University of Alberta. June 28, 2011. Edmonton, Alberta, Canada.

17. Sullivan, K. (2011). Best Value as a Competitive Process for Design and Construction Services. University of Alberta. June 29, 2011. Edmonton, Alberta, Canada.*
18. Sullivan, K. (2011). Best Value within IPD Selection and Delivery. University of Alberta. June 29, 2011. Edmonton, Alberta, Canada.*
19. Sullivan, K. (2011). Strategic Planning and Organization Change. University of Alberta. June 29, 2011. Edmonton, Alberta, Canada.
20. Sullivan, K. (2011). Succession Planning and Mentoring for Electrical Contractors. NECA & Electri International Annual Meeting. July 14, 2011. Chicago, Illinois.*
21. Sullivan, K. (2011). Preplanning and Project Control Methodologies. Alliance for Construction Excellence. July 17, 2011. Phoenix, Arizona
22. Sullivan, K. (2011). Best Value Strategies with the Mayor of Phoenix (Gordon). Mayor's Office, City of Phoenix, AZ. July 20, 2011. Phoenix, Arizona.
23. Sullivan, K. (2011). Productivity Management and Change Orders. Alliance for Construction Excellence. July 25, 2011. Phoenix, Arizona.
24. Sullivan, K. (2011). Preplanning and Project Control Methodologies. Alliance for Construction Excellence. August 1, 2011. Phoenix, Arizona
25. Sullivan, K. (2011). Virtualization Environment and Best Value. University of Alberta. August 4, 2011. Edmonton, Alberta, Canada.
26. Sullivan, K. (2011). Best Value for the Radiopharmaceutical Centre. University of Alberta. August, 4, 2011. Edmonton, Alberta, Canada.
27. Sullivan, K. (2011). Best Value and Preplanning. Alliance for Construction Excellence. August 30, 2011. Luke Air Force Base, Glendale, Arizona.
28. Sullivan, K. (2011). Impact of Bureaucracy on Project Change – A Framework for Evaluation. COBRA RICS Construction and Property Conference. September 13, 2011. Salford, UK.
29. Sullivan, K. (2011).Organizational Change Models: A Critical Review of Change Management Processes. COBRA RICS Construction and Property Conference. September 13, 2011. Salford, UK.
30. Sullivan, K. (2011). Scheduling, Measuring, and Best Value for an IT Project. Idaho Transportation Department. October 12, 2011. Boise, Idaho
31. Sullivan, K. (2011). Leadership and Accountability. Guest Lecture, CON 494: Leadership and Management. Arizona State University. October 18, 2011. Tempe, Arizona.
32. Sullivan, K. (2011). Succession Planning for Electrical Contractors. NECA Annual Conference. October 23, 2011. San Diego, California.*
33. Sullivan, K. (2011). Estimating Basics Part I. Guest Lecture, CON 100: Introduction to Construction. Arizona State University. October 24, 2011. Tempe, Arizona.
34. Sullivan, K. (2011). Estimating Basics Part II. Guest Lecture, CON 100: Introduction to Construction. Arizona State University. October 26, 2011. Tempe, Arizona.
35. Sullivan, K. (2011). Preplanning and Project Control Methodologies. Alliance for Construction Excellence. November 3, 2011. Mesa, Arizona

36. Sullivan, K. and Stewart, B. (2011). Best Value Business Model within a Canadian Context. Canadian Public Procurement Council 2011 Conference. November 7, 2011. Quebec City, Quebec, Canada.*
37. Sullivan, K. and Stewart, B. (2011). Best Value Case Studies and Practical Experiences. Canadian Public Procurement Council 2011 Conference. November 7, 2011. Quebec City, Quebec, Canada.*
38. Sullivan, K. (2011). Risk Management and Performance Measurement: Organizations and Projects. B&D Industries. November 10, 2011. Albuquerque, New Mexico.
39. Sullivan, K. (2011). A Best Value Business Approach. University of New Mexico and Albuquerque Public Schools. November 10, 2011. Albuquerque, New Mexico.
40. Sullivan, K. (2011). Best Value Approach for Towing Services. City of Phoenix, AZ. November 15, 2011. Phoenix, Arizona.
41. Sullivan, K. (2011). Best Value for Design Services. University of Alberta. November 22, 2011. Edmonton, Alberta, Canada.*
42. Sullivan, K. (2011). Best Value for Traditional Construction. University of Alberta. November 22, 2011. Edmonton, Alberta, Canada.
43. Sullivan, K. (2011). Project Salvage Methodologies and Performance Metrics. Idaho Transportation Department. December 1, 2011. Boise, Idaho.
44. Sullivan, K. (2011). Best Value Business Approach and Potential Organizational Vision. Western States Contracting Alliance (WSCA) Annual Conference, Board of Directors Session. December 6, 2011. Scottsdale, Arizona.*
45. Sullivan, K. and Perrenoud, A. (2012). Preplanning and Performance Measurement. 3M Motor Vehicle Division. January 5, 2012. Denver, CO.
46. Sullivan, K. (2012). Best Value Practices. Idaho Transportation Department. January 10, 2012. Boise, Idaho.
47. Sullivan, K. (2012). Best Value for Towing Vendors. City of Phoenix, AZ. January 24, 2012. Phoenix, Arizona.
48. Sullivan, K. (2012). Preplanning and Project Control Methodologies. Alliance for Construction Excellence. January 26, 2012. Phoenix, Arizona
49. Sullivan, K. (2012). Productivity Management and Change Orders. Alliance for Construction Excellence. January 26, 2012. Phoenix, Arizona.
50. Sullivan, K. and Perrenoud, A. (2012). Performance Measurement for IT Design Processes. 3M Motor Vehicle Division. January 27, 2012. Tucson, Arizona.
51. Sullivan, K. (2012). Best Value Selection Methodologies. ASU-PBSRG Annual Best Value Conference, Arizona State University. February 14, 2012. Tempe, Arizona.
52. Sullivan, K. (2012). Best Value Problems and Solutions for Vendor Implementation. ASU-PBSRG Annual Best Value Conference, Arizona State University. February 14, 2012. Tempe, Arizona.
53. Sullivan, K. (2012). Case Study: Large Services Implementation and Test of Best Value Methods. ASU-PBSRG Annual Best Value Conference, Arizona State University. February 15, 2012. Tempe, Arizona.

54. Sullivan, K. (2012). Proper Communication, Preplanning, and Risk Management. ASU-PBSRG Annual Best Value Conference, Arizona State University. February 15, 2012. Tempe, Arizona.
55. Sullivan, K. (2012). Estimating Basics. Guest Lecture, CON 100: Introduction to Construction. Arizona State University. March 2, 2012. Tempe, Arizona.
56. Sullivan, K. (2012). Performance Measurement and it Uses for Manufactured Products: Roofing. Tremco, Inc. March 6, 2012. Beachwood, Ohio.
57. Sullivan, K. and Sawyer, J. (2012). Value-Based Contracting Model. City of Prescott & Prescott Valley. April 11, 2012. Prescott, Arizona.
58. Sullivan, K. and Sawyer, J. (2012). Vision of a Value Based Governmental Environment. League of Arizona Cities and Towns. April 25, 2012. Phoenix, Arizona.
59. Sullivan, K. and Perrenoud, A. (2012). Value-Based Project Approach for Public Works Projects. City of Prescott, Arizona. May 30, 2012. Prescott, Arizona
60. Sullivan, K. and Smithwick, J. (2012). Best Value Business Model. Rochester Community and Technical College. June 5, 2012. Rochester, Minnesota.
61. Sullivan, K. and Smithwick, J. (2012). Best Value in the Public Sector. City of Roseville Educational Seminar. June 6, 2012. Roseville, Minnesota.
62. Sullivan, K. and Smithwick, J. (2012). Value-Based Project Management. Kraus-Anderson Contracting. June 6, 2012. Minneapolis, Minnesota.
63. Sullivan, K. (2012). Best Value Procurement Model. Canadian Association of University Business Officers (CAUBO) Annual Conference. June 16, 2012. Montreal, Quebec, Canada.
64. Sullivan, K. (2012). Best Value Business Model. Canadian Association of University Business Officers (CAUBO) Annual Conference. June 18, 2012. Montreal, Quebec, Canada.
65. Sullivan, K. (2012). Value-Based Contracting. City of Prescott. August 2, 2012. Prescott, Arizona, USA.
66. Sullivan, K. (2012). Best Value Business Model. American Public Works Association – Arizona Monthly Meeting. August 9, 2012. Showlow, Arizona, USA.
67. Sullivan, K. and Lines, B. (2012). Best Value and Organizational Adaptation Seminar. University of Alberta and Arizona State University Seminar. August 28, 2012. Edmonton, Alberta, Canada.
68. Sullivan, K. (2012). Best Value Approach to Business. Public Owners of Alberta Meeting. August 29, 2012. Edmonton, Alberta, Canada.
69. Sullivan, K. (2012). Best Value Business Model. Alberta Infrastructure Organizational Meeting and Education. August 30, 2012. Edmonton, Alberta, Canada.
70. Sullivan, K. (2012). RICS Cobra Conference Coordinator and Master of Ceremonies. Royal Institute of Chartered Surveyors Construction, Building, and Real Estate (COBRA) Conference. September 10-13, 2012. Las Vegas, Nevada, USA.

71. Gajjar, D., Sullivan, K., Kashiwagi, D. (2012). "Manufacturer's Use of End User to Minimize Risk." Paper Presentation. RICS COBRA RICS Annual Conference. September 10-13, 2012. Las Vegas, Nevada, USA.
72. Smithwick, J., Sullivan, K., Stone, B. (2012). "Risk Management Structure for Value-Based Commodity Contracts." Paper Presentation. RICS COBRA RICS Annual Conference. September 10-13, 2012. Las Vegas, Nevada, USA.
73. Sullivan, K., Lines, B., Stewart, B., and Warren, H. (2012). "Impact of Preplanning on Construction Project Success: Pre-Contract Planning Case Study." Paper Presentation. RICS COBRA RICS Annual Conference. September 10-13, 2012. Las Vegas, Nevada, USA.
74. Ferrin, P., Lines, B., Sullivan, K., and Kashiwagi, D. (2012). "Framework for Managing Outsourcing – A Large Scale Services Contract Case Study." Paper Presentation. RICS COBRA RICS Annual Conference. September 10-13, 2012. Las Vegas, Nevada, USA.
75. Prrenoud, A. and Sullivan, K. (2012). "Review and Case Study of Interoperability with Building Information Modeling and Facility Management Processes." Paper Presentation. RICS COBRA RICS Annual Conference. September 10-13, 2012. Las Vegas, Nevada, USA.
76. Sullivan K., Lines, B., Stone, B., Stewart, B., and Warren, H. (2012). "Change Management Principles: Best Value Implementation Case Study." Paper Presentation. RICS COBRA RICS Annual Conference. September 10-13, 2012. Las Vegas, Nevada, USA.
77. Perrenoud, A., Stone, B., Sullivan, K., and Savicky, J. (2012). "Case Study: The Implementation of a Performance Metric System in a Capital Improvement Organization." Proceedings of COBRA RICS Construction and Property Conference 2012, Las Vegas, NV, USA, September 10-13, 2012, pp 1095-1102.
78. Sullivan, K. (2012). Best Value Business Model. W3 Conference (Western University Financial Officers, Western Universities Supply Management Association, and Western Association of Resource Planners). September 20, 2012. Vancouver, British Columbia, Canada.
79. Sullivan, K. and Perrenoud, A. (2012). Succession Planning for Electrical Contractors. Electri International Annual Meeting. September 30, 2012. Las Vegas, Nevada, USA.
80. Sullivan, K. (2012). Best Value for Facility Management. ISS Facility Services. October 4, 2012. Phoenix, Arizona, USA.
81. Sullivan, K. (2012). Best Value Business Model. Intel Corporation. October 5, 2012. Chandler Arizona, USA.
82. Sullivan, K. (2012). Value-Based Contracting. Sheet Metal Workers International Association – Western States Council Fall 2012 Convention. October 5, 2012. Phoenix, Arizona, USA.
83. Sullivan, K. (2012). Project Management: Budgeting and Estimating. Alliance for Construction Excellence. November 5, 2012. Glendale, Arizona, USA.
84. Sullivan, K. (2012). Best Value Business Model. Alberta Services – Provincial Government. November 8, 2012. Edmonton, Alberta, Canada.

85. Sullivan, K. (2012). Value-Based Approach to Information Technologies Projects. University of Alberta and IT Professionals. November 8, 2012. Edmonton, Alberta, Canada
86. Sullivan, K. (2012). Best Value Project Model. Alberta Infrastructure Project Manager Group. November 9, 2012. Edmonton, Alberta, Canada.
87. Sullivan, K. and Lines, B. (2012). Best Value Business Model. 2012 Modular and Off-site Construction Summit. November 9, 2012. Edmonton, Alberta, Canada.
88. Sullivan, K. and Perrenoud, A. (2012). Best Value Business Model. American Public Works Association – Arizona Northern Branch. November 13, 2012. Prescott Valley, Arizona, USA.
89. Sullivan, K. (2012). Best Value Business Model. Dalhousie University. December 4, 2012. Halifax, Nova Scotia, Canada.
90. Sullivan, K. and Lines, B. (2012). Best Value and Organizational Adaptation Seminar. Interuniversity Services, Inc. Seminar. December 5-6, 2012. Halifax, Nova Scotia, Canada.
91. Sullivan, K. and Savicky, J. (2013). Alaska Rocket Launch Pad Best Value Approach. Alaska Aerospace Corporation. January 15, 2013. Tempe, Arizona, USA.
92. Sullivan, K. (2013). Value-Based Project Approach. Rider Levitt Bucknall Leadership Meeting. January 25, 2013. Scottsdale, Arizona, USA.
93. Sullivan, K. (2013). Performance Information Environment. Tremco Leadership Summit. January 29, 2013. Phoenix, Arizona, USA.
94. Sullivan, K. (2013). Best Value Contracting. Yukon Territorial Government. February 5, 2013. Whitehorse, Yukon, Canada.
95. Sullivan, K. (2013). Best Value Overview and Organizational Applications. Alberta Infrastructure. February 7, 2013. Edmonton, Alberta, Canada.
96. Sullivan, K. (2013). Best Value Business Model. City of Edmonton. February 7, 2013. Edmonton, Alberta, Canada.
97. Sullivan, K. (2013). Best Value Business Model. City of Calgary. February 8, 2013. Calgary, Alberta, Canada.
98. Sullivan, K. (2013). Best Value Business Model. University of Calgary. February 8, 2013. Calgary, Alberta, Canada.
99. Sullivan, K. (2013). An Approach to Value Based Project Delivery. Dalhousie University. March 12, 2013. Halifax, Nova Scotia, Canada.
100. Sullivan, K. (2013). Performance Information Environment. Webinar. Tremco Roofing Systems. March 14, 2013. Tempe, Arizona, USA.
101. Sullivan, K. (2013). Performance Based Contracting. National Institute of Government Purchasers – Edmonton Chapter. March 20, 2013. Edmonton, Alberta, Canada.
102. Sullivan, K. (2013). Best Value Business Model. California Institute of Technology (CalTech). April 10, 2013. Pasadena, California, USA.
103. Sullivan, K. (2013). Best Value Business Model. California Polytechnic – San Luis Obispo (CalPoly-SLO). April 11, 2013. San Luis Obispo, California, USA.
104. Sullivan, K. (2013). Best Value Business Model. University of California – Santa Barbra (UCSB). April 12, 2013. Santa Barbra, California, USA.

APPENDIX C

CLIENTS

The Performance Based Studies Research Group (PBSRG) has partnered with construction and non-construction companies for over 20 years, to prototype test the theoretical development of the best value approach. Research clients are the major source of funding for PBSRG, and have been the differentiating factor that has separated it from the traditional research approach and has allowed the best value approach to modify and mature to its most recent state (PBSRG, 2014; Kashiwagi, 2014). The Performance Based Studies Research Group (PBSRG) has the following grants (PBSRG, 2014):

- Total Research Grant Amount is $15,905,535.
- Total number of unique clients is 123.

Year: 2014			
328	Arizona Dept. of Environmental Quality	$	200,000
327	Century Link (Qwest)	$	37,500
326	City of Rochester Fire Station	$	10,000
325	City of Roseville, MN	$	50,000
324	Dalhousie University	$	125,000
323	The Gordian Group	$	100,000
322	Neogard div. of Jones Blair Inc. Corp.	$	115,000
321	Polk County Utilities	$	17,500
320	Rochester Public Schools, ISD 535 (MN)	$	25,000
319	SMACNA	$	86,000
318	State of Alaska	$	50,000
317	Tremco	$	100,000
316	University of Manitoba	$	125,000
315	New Horizons Foundation	$	75,000
314	Construction Industry Institute	$	230,000
313	City of Spruce Grove	$	5,000
312	Simon Fraser University	$	110,000
311	City of Rochester Civic Center	$	70,000
		$	1,531,000
Year: 2013			
310	Alberta Infrastructure	$	125,000
309	Anoka-Hennepin ISD 11	$	5,000
308	Aramark	$	20,000
307	Century Link (Qwest)	$	15,000
306	City of Rochester	$	47,500

305	City of Roseville, MN	$	50,000
304	City of Spruce Grove	$	50,000
303	Consumer Financial Protection Bureau (CFPB)	$	100,000
302	Dalhousie University	$	125,000
301	Elk River ISD 728	$	13,125
300	Intermediate School District 287 (MN)	$	5,000
299	Minneapolis School District No. 1	$	6,000
298	Neogard div. of Jones Blair Inc. Corp.	$	115,000
297	Rochester Public Schools, ISD 535 (MN)	$	30,000
296	Rochester Public Schools, ISD 535 (MN)	$	22,250
295	Salt River Project	$	75,000
294	Simon Frasier University (Canada)	$	110,000
293	State of Oklahoma, DHS	$	50,000
292	Tremco	$	100,000
291	University of Manitoba	$	125,000
290	3M	$	50,000
289	Canadian Consortium	$	260,000
		$	1,498,875
Year: 2012			
288	Aramark	$	20,000
287	Boise State University	$	75,000
286	Canon	$	40,000
285	Century Link (Qwest)	$	15,000
284	Century Link (Qwest)	$	25,000
283	City of Phoenix	$	45,000
282	City of Rochester PWTOC	$	17,500
281	City of Rochester Lenwood Hgts.	$	10,000
280	City of Roseville, MN	$	75,000
279	Hennepin County, MN	$	25,000
278	Idaho Transportation Dept.	$	50,000
277	Neogard div. of Jones Blair Inc. Corp.	$	115,000
276	Polk County, FL	$	17,500
275	State of Oklahoma	$	50,000
274	University of Alberta	$	100,000

273	University of Minnesota	$	37,500
272	Brunsfield	$	75,000
271	Electri International	$	7,000
270	State of New Mexico	$	100,000
		$	899,500
Year: 2011			
269	Academic Partnership	$	35,000
268	Aramark	$	20,000
267	Boise State University	$	75,000
266	Brunsfield	$	75,000
265	Canon	$	40,000
264	City of Columbia, SC	$	3,609
263	City of Columbia, SC	$	10,000
262	City of Phoenix	$	75,000
261	City of Rochester Volleyball Center	$	15,000
260	City of Rochester	$	20,000
259	Hennepin County, MN	$	50,000
258	Idaho Transportation Dept.	$	75,000
257	Neogard div. of Jones Blair Inc. Corp.	$	115,000
256	Pearson eCollege	$	35,000
255	Qwest/Century Link	$	35,000
254	Rochester Public Schools, ISD 535 (MN)	$	10,000
253	State of Alaska	$	50,000
252	State of Oklahoma	$	100,000
251	State of Oregon	$	60,000
250	Tremco	$	100,000
249	University of Minnesota	$	75,000
248	University of Alberta	$	100,000
247	VW International Inc.	$	135,000
246	CMS	$	50,000
245	GSA Region 6	$	43,000
		$	1,401,609

Year: 2010

244	Aramark	$	20,000
243	ASU Data Center	$	40,000
242	ASU On-Line Program	$	25,000
241	ASU Help Desk	$	10,000
240	ASU TV	$	10,000
239	ASU Bookstore	$	35,000
238	Brunsfield	$	75,000
237	Correctional Medical Services (CMS)	$	50,000
236	Fann Environmental	$	14,400
235	GSA Region 6	$	39,500
234	GSA Region 6	$	100,000
233	Idaho Transportation Dept.	$	95,000
232	Intermediate School District 287 (MN)	$	30,000
231	Neogard div. of Jones Blair Inc. Corp.	$	115,000
230	Polk County, FL	$	17,500
229	Rochester Public Utilities	$	20,000
228	Rochester Public Utilities	$	15,000
227	Rochester Public Schools, ISD 535 (MN)	$	7,500
226	Rochester Public Schools, ISD 535 (MN)	$	9,600
225	Rochester Public Schools, ISD 535 (MN)	$	11,400
224	Salt River Project (SRP)	$	30,000
223	Salt River Project (SRP)	$	8,000
222	State of Alaska	$	145,000
221	State of Idaho	$	75,000
220	State of Oklahoma	$	100,000
219	State of Oregon	$	75,000
218	VW International Inc.	$	158,000
217	Boise State University	$	75,000
		$	1,405,900

Year: 2009

216	Abengoa (Solar)	$	48,914
215	Air Force - Hardlines Design Co.	$	20,000
214	Aramark	$	15,000

213	Arizona State Parks	$	6,500
212	ASU UTO	$	50,000
211	ASU UTO	$	35,000
210	Bank of Botswana (Africa)	$	10,000
209	Canon	$	40,000
208	City of Peoria	$	30,000
207	City of Roseville (MN)	$	5,000
206	Coconino County	$	3,000
205	GSA Region 6	$	6,000
204	GSA Region 6	$	47,000
203	Neogard div. of Jones Blair Inc. Corp.	$	115,000
202	Polk County, FL	$	17,500
201	Rochester Public Schools, ISD 535 (MN)	$	20,000
200	State of Idaho	$	25,000
199	State of Oklahoma	$	75,000
198	St. Louis County, MN	$	10,000
197	University of Botswana (Africa)	$	15,000
196	University of Minnesota	$	75,000
195	VW International Inc.	$	140,000
194	US Solar & Dept. of Energy	$	137,343
193	Boise State University	$	100,000
		$	1,046,257

Year: 2008

192	Air Force - Hardlines Design Co.	$	25,000
191	Anthem Community Council	$	15,000
190	Aramark	$	37,241
189	ASU EHS	$	11,300
188	ASU UTO	$	50,000
187	ASU SRC	$	90,000
186	ASU Parking Transit Services	$	40,000
185	ASU ICA	$	25,000
184	Butt Construction	$	25,000
183	C.A. Lindman Inc.	$	2,000
182	City of Peoria	$	30,000

181	City of Roseville (MN)	$	5,000
180	Custom Seal	$	10,000
179	Neogard div. of Jones Blair Inc.	$	115,000
178	NYNJ Port Authority	$	15,000
177	Schering Plough	$	17,500
176	State of Idaho	$	75,000
175	State of Oklahoma	$	75,000
174	Tremco	$	100,000
173	United Excel Corporation	$	3,750
172	University of Botswana (Africa)	$	40,000
171	University of New Mexico	$	5,000
170	University of Minnesota	$	100,000
169	VW International Inc.	$	130,000
		$	1,041,791
Year: 2007			
168	Air Force - Hardlines Design Co.	$	10,000
167	Arizona Public Service (APS)	$	15,000
166	ASU MU	$	15,000
165	ASU Univ. Bus. Svc.	$	10,000
164	AZ State Parks	$	15,000
163	City of Peoria	$	30,000
162	Custom Seal	$	10,000
161	Denver Health & Hospital Authority (DHHA)	$	15,000
160	Denver Health & Hospital Authority (DHHA)	$	15,000
159	Envision Strategies (CO)	$	5,000
158	General Dynamics AIS	$	115,000
157	General Dynamics AIS	$	8,625
156	General Dynamics AIS	$	25,000
155	Global Engineering	$	35,000
154	Neogard div. of Jones Blair Inc.	$	115,000
153	NYNJ Port Authority	$	10,000
152	RMIT University	$	5,000
151	Schering Plough	$	35,000
150	State of Missouri	$	33,250

149	State of Wyoming	$	33,250
148	Tremco	$	100,000
147	University of Minnesota	$	75,000
146	United Excel Corporation	$	7,500
145	VW International Inc.	$	95,000
144	VW International Inc.	$	37,500
143	US Solar & Dept of Energy	$	137,434
		$	1,007,559
Year: 2006			
142	ASU Budget System Project	$	5,000
141	AZ School Facilities Board	$	5,000
140	City of Peoria	$	30,000
139	Custom Seal	$	10,000
138	Entergy	$	75,000
137	Global Engineering	$	35,000
136	J&J	$	6,000
135	Nadaburg Elementary School District	$	10,000
134	Neogard div. of Jones Blair Inc.	$	115,000
133	OP2	$	10,000
132	State of Missouri	$	33,250
131	Tremco	$	100,000
130	United Excel Corporation	$	3,750
129	University of Minnesota	$	75,000
128	VW International Inc.	$	37,500
127	VW International Inc.	$	18,750
126	Washington DOT	$	50,000
		$	619,250
Year: 2005			
125	City of Peoria	$	25,000
124	Custom Seal	$	10,000
123	FAA	$	176,400
122	Harvard University	$	37,500
121	Harvard University	$	2,000
120	Holy Family Memorial (WI)	$	5,000

119	Neogard div. of Jones Blair Inc.	$	115,000
118	Raytheon	$	24,995
117	State of Washington	$	50,000
116	United Airlines	$	5,000
115	University of Minnesota	$	75,000
114	VW International Inc.	$	75,000
113	US Coast Guard / NTVI	$	50,000
		$	650,895
Year: 2004			
112	City of Peoria	$	25,000
111	Custom Seal	$	10,000
110	FAA	$	171,720
109	General Dynamics	$	135,000
108	Harvard University	$	37,500
107	Neogard div. of Jones Blair Inc.	$	110,000
106	VW International Inc.	$	75,000
		$	564,220
Year: 2003			
105	Dallas Independent School District	$	9,999
104	Denver Health and Hospital Authority	$	10,000
103	FAA	$	159,974
102	Neogard div. of Jones Blair Inc.	$	110,000
101	State of Washington	$	35,000
100	US Coast Guard / NTVI	$	50,000
		$	374,973
Year: 2002			
99	Dallas Independent School District	$	9,989
98	Neogard div. of Jones Blair Inc. Corp.	$	110,000
		$	119,989
Year: 2001			
97	BASF	$	35,000
96	Custom Seal	$	10,000

95	Dallas Independent School District	$	49,000
94	Neogard div. of Jones Blair Inc.	$	75,000
93	State of Hawaii	$	175,000
92	University of Hawaii	$	75,000
91	USPFO of Wyoming	$	10,000
		$	429,000
Year: 2000			
90	BASF	$	35,000
89	National Energy Management Institute (NEMI)	$	10,000
88	SMACNA	$	13,600
87	State of Hawaii	$	136,500
86	State of Hawaii Central Services	$	88,038
85	State of Hawaii DAGS	$	75,000
84	United Airlines	$	45,000
83	University of Hawaii	$	75,000
		$	478,138
Year: 1999			
82	City of Tempe, AZ	$	15,000
81	FAA	$	140,468
80	Honeywell	$	40,000
79	IPI	$	35,000
78	Neogard div. of Jones Blair Inc. Corp.	$	75,000
77	Neogard div. of Jones Blair Inc. Corp.	$	75,000
76	Peco	$	50,000
75	State of Georgia	$	100,000
74	State of Hawaii	$	7,000
73	State of Hawaii	$	5,000
72	State of Hawaii	$	75,000
71	State of Utah	$	7,500
70	State of Utah	$	45,000
69	State of Utah	$	43,000
68	State of Utah	$	15,000
67	State of Utah	$	15,000
66	State of Utah	$	45,000

65	State of Utah	$	45,000
64	United Airlines	$	180,000
		$	1,012,968
Year: 1998			
63	FAA	$	154,847
62	United Airlines	$	180,000
		$	334,847
Year: 1997			
61	Facility Management Group	$	18,250
60	Facility Management Group	$	35,000
59	Facility Management Group	$	29,397
58	FAA	$	69,726
57	FAA	$	49,773
56	Facility Management Group	$	6,850
55	Flooring Contractors	$	6,750
54	Honeywell	$	12,000
53	Job Order Contractors (JOC)	$	20,200
52	Neogard div. of Jones Blair Inc. Corp.	$	6,250
51	Neogard div. of Jones Blair Inc. Corp.	$	145,000
50	SPF Roofing Contractors	$	30,392
49	SMACNA - 40 contractors	$	11,000
48	United Airlines	$	20,000
		$	460,588
Year: 1996			
47	Facility Management Group	$	8,850
46	Facility Management Group	$	9,724
45	BP Oil - Research	$	55,000
44	DOW Corning	$	10,400
43	Electrical Contractors Group	$	7,500
42	Facility Management Group	$	13,191
41	Facility Management Group	$	27,850
40	Facility Management Group	$	91,830
39	General Contractors	$	4,500

38	Job Order Contractors (JOC)	$	20,200
37	SPF Roofing Contractors	$	35,696
36	SPF Roofing Manufacturers	$	9,500
		$	294,241
Year: 1995			
35	Arizona Carpenters	$	3,075
34	Coating Manufacturers	$	55,000
33	DOW Corning	$	10,000
32	Facility Management Group	$	32,775
31	Facility Management Group	$	15,092
30	Facility Management Group	$	2,000
29	Facility Management Group	$	108,052
28	Facility Management Group	$	32,500
27	IBM / MK	$	2,500
26	International Rectifier	$	10,000
25	Job Order Contractors (JOC)	$	16,042
24	Motorola Inc.	$	33,995
23	Neogard div. of Jones Blair Inc. Corp.	$	6,050
22	SPF Roofing Manufacturers	$	26,000
21	State of Wyoming	$	14,000
20	US Army Medical Command	$	14,000
		$	381,081
Year: 1994			
19	Arizona Carpenters Union	$	8,400
18	Burr-Brown	$	10,000
17	Coating Manufacturers	$	12,300
16	Facility Management Group	$	12,500
15	Facility Management Group	$	16,400
14	IBM / MK	$	10,000
13	IBM / MK	$	2,500
12	Intel Corp.	$	6,250
11	Job Order Contractors (JOC)	$	11,250
10	Motorola Arlington Heights	$	56,000
9	Motorola Arlington Heights	$	18,835

8	SMACNA	$	6,858
		$	171,293
Year: 1993			
7	Facility Management Group	$	116,381
6	Facility Management Group	$	7,427
5	Facility Management Group	$	11,778
4	Facility Management Group	$	15,375
3	Job Order Contractors (JOC)	$	7,500
2	SPF Roofing Contractors	$	13,300
1	SPF Roofing Manufacturers	$	9,800
		$	181,561

APPENDIX D

LICENSES

The Performance Based Studies Research Group (PBSRG) has developed the best value approach into a business model called the Performance Information Procurement System (PIPS) that has been licensed through AzTech at Arizona State University. Since 2000, the best value PIPS business model has been licensed 38 times, making it the most licensed technology at Arizona State University (PBSRG, 2014; Kashiwagi, 2014).

Innovation – Licenses through AzTech for PIPS (Total: 38) (PBSRG, 2014):

No.	Year	Licensed to:
38	2014	University of Western Ontario
37	2014	Wilfrid Laurier University
36	2014	Queen's University
35	2014	University of Waterloo
34	2014	University of Ottawa
33	2014	Alberta Infrastructure
32	2014	Arizona Dept. of Environmental Quality (ADEQ)
31	2013	SJCE
30	2013	Dalhousie University
29	2013	Simon Frasier University (Canada)
28	2013	RISNET (PM group in Netherlands)
27	2013	University of Manitoba
26	2013	Consumer Financial Protection Bureau (CFPB)
25	2012	City of Roseville, MN
24	2012	NEVI (Dutch Procurement Group)
23	2011	Boise State University
22	2011	Brunsfield
21	2011	Hennepin County, MN
20	2011	University of Botswana, IT Dept.
19	2011	University of Botswana, Faculty of Engineering and Technology
18	2010	GSA Region 6
17	2010	State of Alaska
16	2010	University of Alberta
15	2009	Polk County
14	2009	State of Idaho
13	2008	Scenter
12	2008	Delft University of Technology
11	2008	State of Oklahoma
10	2006	Schering Plough Corporation
9	2006	Ministry of Transport Public Works (Netherlands)
8	2006	Heijmans Infrastructuur BV
7	2006	Entergy
6	2005	University of Minnesota
5	2004	US Army Medical Command (MEDCOM)

4	2003	US Coast Guard
3	2003	Federal Aviation Administration
2	2001	University of Hawaii
1	2000	State of Hawaii

APPENDIX E

MAJOR CASE STUDIES AND RESEARCH DEVELOPMENTS

Phase 0 of Best Value PIPS [1981-1993]: Creation of PBSRG

The Performance Based Studies Research Group (PBSRG) has had numerous major case studies and streams of important research efforts that have been directly responsible for the growth and development of the best value approach. In this appendix, the following number of major case studies and streams will be identified (PBSRG, 2014):

- Major Streams (6)
- Major Case Studies (22)

Dean Kashiwagi was sent by the U.S. Air force to Arizona State in 1981, to conduct his Master's work in Construction Management. This is when Dean Kashiwagi first identified performance information is the key to identifying expertise and high performance. Dean became involved with sprayed polyurethane foam (SPF) contractors, which became the initial groundwork for identifying performance information (he later developed the best value approach). Dean began tracking the performance of SPF roofing systems around the country and identified the following (Kashiwagi, et al., 2008b; PBSRG, 2014; Kashiwagi, 2014):

- Over 200 SPF roofs tracked.
- High customer satisfaction ratings recorded.
- Many SPF rooks lasted past warranties.
- Dean identified the U.S. Air force policy against SPF roofs was inaccurate
- SPF roofs had significant cost savings for owners over its lifetime.

From 1983-1986, Dean Kashiwagi returned to the U.S. Air force to the Engineering Service Center, where he presented on his findings from Arizona State at a roofing conference, regarding the high performance of the SPF roofing systems, and the low performing roofing program of the U.S. Air force. Due to his findings, Dean Kashiwagi was perceived to be antagonistic and was investigated and shut down by the Office of Special Investigation (OSI) (Kashiwagi, et al., 2008; PBSRG & Kashiwagi, 2014).

From 1987-1989, Dean Kashiwagi volunteered on a remote assignment to Saudi Arabia for a two year term. There, he began working on collecting performance information again. At the time, Saudi Arabia was developing plans to build six major safety bunkers across Saudi Arabia for the six royal families. Dean identified a solution that would save the Saudis $20M. After convincing the Saudis to except his plan, he was excused from his remote assignment for 30 days to gather the technology needed to accomplish this goal. After 30 days, Dean went back to Saudi Arabia and they implemented his plan (Kashiwagi, et al., 2008b; PBSRG, 2014; Kashiwagi, 2014).

Shortly after his remote assignment in Saudi Arabia, Dean Kashiwagi was identified by the U.S. Air force to return to Arizona State until 1991, for his PhD studies in Industrial Engineering. Dean worked under the former Dean of the Del E Webb School of Construction, William Badger. Dr. Badger, had only one rule "there are no rules." Dr. Badger had a philosophy that allowed professors and researchers to identify what area of expertise they wanted to develop and had the freedom to explore that expertise the best way they knew how. In the three years at Arizona State, working under Dr. Badger's "No rules environment," Dean Kashiwagi continued to work with roofing contractors to eventually develop the first value based model he called "Performance Based Design/Procurement System (PBDPS), later changed to the "Performance Information Procurement System and Performance Information Risk Management System (PIPS/PIRMS)." In his dissertation, Dean Kashiwagi identified management, direction, and control (MDC) as the number one cause for non-performance in the construction industry (Kashiwagi, et al, 2008b; PBSRG, 2014; Kashiwagi, 2014).

After completing his PhD at Arizona State University, Dr. Dean Kashiwagi returned to the Air Force Institute of Technology (AFIT) at Wright Paterson, Air Force Base to test and implement his preliminary observations from his dissertation. The AFIT was not open to the concepts. Shortly after his return, Dean received a notice from the U.S. Air force that stated, "the Air Force is downsizing and will release any personnel that would like to leave, and retire any personnel that served a minimum of 14 years." Dr. Dean decided to retire from the U.S. Air force and returned to the Del E Webb School of Construction at Arizona State University to continue the academic research to test and optimize the best value approach (Kashiwagi, et al., 2008b; PBSRG, 2014; Kashiwagi, 2014).

Del E Webb School of Construction Environment

When Dr. Dean Kashiwagi permanently returned to Arizona State University in 1992, the DEWSC initially had no research funding for professors. Research was recommended, while the school was primarily a teaching unit. External to DEWSC, the College of Engineering and Applied Sciences (CEAS) made a shift by responding to the construction industry non-performance, by separating the education and training areas. The primary focus shifted from teaching to conducting research, in order to become a world-ranked institution. The goal was to deliver useful research to industry, community, and create an undergraduate education program that produces construction management personnel for the construction industry. When the CEAS made the shift in focus, DEWSC made research its focus. DEWSC identified major sources of construction grants, and the traditional research approach began implementation. The traditional research approach included the following (Kashiwagi, et al., 2006; Kashiwagi, et al., 2008b; PBSRG, 2014; Kashiwagi, 2014).

- Source of funding was primarily based on grants.
- Grantee agencies had their own research areas.
- Research was not focused on industry structure, inefficiency, and ineffectiveness of client's delivery system, and use of performance measurements.
- Professors had to identify research areas being requested, submit lengthy competitive proposals, wait for approval, and then conduct research in awarded area.
- Researchers became reactive.

- Researchers must become expert in area of funding.
- If funding source changed interests, researcher must change to meet demand.
- Difficult to develop expertise in area [10+ years] if areas of interest changed.
- Researchers must continually compete for grants.
- Research findings were usually studies/reports that documented current practices that may propose new models/practices, with difficulty implementing research findings.
- Successful research professors were under resistance from struggling professors, due to successful research putting pressure on non-performing research.

Performance Based Studies Research Group (PBSRG)

Due to the reactive environment at the DEWSC and low performance of the traditional research approach, Dr. Dean Kashiwagi created the Performance Based Studies Research Group (PBSRG) in 1993 and developed a new research approach to further develop and test the best value approach (PBSRG, 2014; Kashiwagi, 2014).

New Research Approach Structure (PBSRG, 2014):

- Professor is the mainstay of research instead of graduate students.
- Professor is the worldwide “expert.”
- Funding is “sole source” due to professor’s expertise.
- Collaboration with other researcher’s research is minimized.
- Research is considered “consulting” and “discovery” at the same time.
- Assumptions attack traditional model; assumes everyone else is wrong regardless of position.
- Research area is larger than area of traditional expertise [construction].
- Use research funding to minimize academic administrative duties [research integrated into all professor’s duties].
- Goal is to increase expertise and not academic promotion.
- Merge teaching with academic expertise; offer students both learning and accurate and latest industry practice.
- Use General Patton's military approach to initially become sustainable:
    - Only work with visionary clients.
    - Do not contest the opposition.
    - Go around opposition and perform work that will remove any resistance [arguments].
    - Come back around and dominate with test results.

Performance Based Studies Research Group (Kashiwagi, et al., 2008; PBSRG, 2014):

- Started with printing business cards and using a local account to run business transactions.
- Developed with no approvals from the College of Engineering.
- Required no university or government grant funding.

- Funding model was limited to test partners who used PBSRG proposed solutions.
- Sole source experts in areas of Information Measurement Theory and Best value approach.
- Was a business unit that required no financial support from the College of Engineering and DEWSC.
- Unlike other research groups, which were dependent on master's and PhD students, used students at all levels to support the research.
- PBSRG is heavily dependent on the major researcher/professor Dean Kashiwagi as the expert and the students as support.
- PBSRG identified five major areas to seek operational funding:
    - Construction clients that were not receiving high performance.
    - High performance contractors/manufacturers, who wanted to gain a competitive advantage of their high performance.
    - High performing industry participants, who were naturally efficient and wanted to add value to others.
    - Unions, training groups, safety groups, who wanted to see change and help the industry become better trained.
    - Professional groups seeking change and continuous improvement.

The following are test results and measurements of the best value PIPS (Chong, et al., 2007; PBSRG, 2014):

1. Duration of testing: 21 years.
2. Total research funding: $15.9M
3. Number of research tests: 1600+
4. Construction services procured: $6B
5. Non-construction services procured: $4B
6. Largest projects: $100M City of Peoria Wastewater Treatment DB project (2007); $53M Olympic Village/University of Utah Housing Project (2001); $1B Infrastructure project in Netherlands (2009);
7. 98% vendor performance.
8. Management effort of client’s construction managers: minimized by 80 to 90% (University of Hawaii (2000) and University of Minnesota (2006), and the ability of project managers to deliver 10 times the amount of projects (State of Hawaii (1997-2001).
9. Risks and reasons for stopping best value PIPS testing: the expert of best value PIPS moves or retires, political change, someone in the organization feels threatened and stops process, organization is too inefficient, ineffective, and bureaucratic to make process work.

Phase I of Best Value PIPS [1994-1998]: Documenting Past Performance Information

In this section, PBSRG primarily worked with roofing contractors and facilities managers (FM) on small maintenance contracts (PBSRG, 2014):

- 23 clients
- $1.8M of services
- Major Case Studies and Streams
    - Local Organizations
    - Job Order Contracting
    - Federal Government Stream
    - United Airlines
    - Neogard Stream

Phase I of the best value approach identified the following (Kashiwagi, 1995; Kashiwagi & Moor, 1995; Kashiwagi, et al., 1996; Kashiwagi, 2014):

- Primary Work: Roof surveying and small FM projects.
- Calculations for prioritization had to be simple and dominant or it would not work.
- Decision-making increases transactions.
- It was identified that the best value should be the lowest cost or provide a dominant reason why it was not. It took until 2005 to identify the best was the best for the lowest cost.
- Vendors would not use the best value PIPS for continuous improvement, because the model would tell them where to improve next, and they did not understand the model was designed for such reasons.
- Key component of operation was the site superintendent.
- First questioned the importance of past performance.
- Where should the past performance come from (Vendors or Clients)?
- Performance information:
    - Identified collecting past performance took too long.
    - Past performance did not have a major impact on minimizing risk as previously thought.
    - Later tests [State of Utah] identified past performance is the least important information.
    - Vendors only should maintain their past performance, in order to identify continual improvements and find sources of non-performance.
- Displaced ideal Model (DIM) Mechanism was used to prioritize contractors on their performance.
    - It was a complex and detail oriented algorithm.
    - It was not well understood by contractors or professionals, and later had tremendous issues in the States of Utah and Hawaii in the phase II of PIPS.
    - The model operated poorly with minor adjustments.
    - The DIM was totally cancelled in the early 2000s [See Phase II of PIPS].

Local Organizations

In 1994, the primary business of PBSRG was test projects, and collecting roofing information in the Southwest [Motorola (Phoenix & Chicago), Intel, IBM, McDonald Douglas, and local facilities groups]. The roofing projects were straightforward and simple. PBSRG staff consisted of Dr. Dean, his wife, his second son Aaron, and a few undergraduate students. PBSRG collected information on simple roofing projects [customer satisfaction, age of the roofs, and percentage of roofs not leaking, never leaked, and if it was fixed.]. The best value system worked well on the projects and identified one of the "flaws" of the construction industry (Kashiwagi, 2014):

- Warranty problem: PBSRG identified that the warranty was technical and required lawyers to conduct the transactions.
- Once the warranty was up, it became so confusing, it was difficult to identify if the manufacturer was at fault for a faulty roof or the client who purchased the roofing system.
- The warranty issue thrived in the price-based environment, where decision-making and complexity were at the forefront, due to low bid contractors laying the roofing system inadequately.
- In the best value environment, high performers were identified and the warranty lost its power.

Additional to collecting roofing performance data, PBSRG did janitorial and landscaping service projects. These were not as simple and straightforward as the roofing projects. After running a test with one janitorial project, it was identified that the client was hiring based on price and partnering with a large national firm based on a relationship. The national firm could not practice their work without needing the constant direction from the client. Within one month, the facilities manager of the client fired the national firm (Kashiwagi, 2014).

Lessons Learned (Kashiwagi, 2014):

- Janitorial and landscaping industry were assumed to hire large, nationwide organizations that could offer low prices.
- Key component of operation was site superintendent.
- Labor force was migratory and transient, non-English speaking, and paid minimum wage.

Job Order Contracting

In March 1991, Dr. Bill Badger and Dean Kashiwagi identified a problem in the construction industry. Dr. Badger and Dean Kashiwagi identified the procurement system was taking anywhere from six months to two years to complete. After some researching, two innovative contracting approaches were discovered; the Japanese automobile industry Just in time and partnering contracting delivery system, and the Supreme Headquarters Allied Power Europe (SHAPE) in the early 1980s (Kashiwagi & Al-

Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002).

The SHAPE contracting model paralleled the Japanese model, and was further developed in Brussels, Belgium in 1982. The SHAPE contracting model was revolutionary and created for minor construction and maintenance work. The model was called Job order contracting (JOC). Dr. Badger and Dean Kashiwagi, identified this model, which was created to eliminate lengthy procurement lead-times for design and construction and generate greater responsiveness and higher quality construction from contractors, would be beneficial to facility owners (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002).

The United States Military tested JOC at the Academy West Point, and realized the disadvantages of the traditional design-bid-build and low bid delivery system that had no standards. Major differences in JOC is the creation of standard specifications, unit price book of construction items, competitive bid environment, and an indefinite delivery, indefinite quantity (IDIQ) contract that allowed the hired contractors to have long term contracts at a firm fixed price. Up until JOC was introduced in the construction industry, there were no building standards, and contractors would receive jobs based on low bids, and drive minimum standards down to meet their low bid budget (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002).

In 1994, Dr. Dean began using the JOC alongside the newly created Performance Based Procurement System (PBPS), which was the first model of best value approach, now known as the best value PIPS. The steps of the JOC are the following (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002):

- Identify a requirement.
- Issue RFP to contractor.
- Contractor/owner create scope of work.
- Contractor estimates job using unit price book (UPB).
- User approves design and cost and awards a firm fixed price.
- Task order is issued, contractor completes the work, then gets paid.

Advantages of JOC (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002):

- Facility owners did not have to provide complete designs, shortened delivery times, reduced procurement costs, and provided long-term win-win partnerships.

Problems with JOC (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002):

- Low bidding contractors were still securing contracts and not performing, to include overcharging on items not listed in UPB, inflated quantities, and lower quality material and workmanship.
- Facility owners did not have a way to manage the capability of contractors.
- UPB did not define many critical items for construction.

Center for Job Order Contracting Excellence (CJE) (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002):

- In 1994, a group of JOC/SABER/DOC contractors met at Arizona State University to address the successes, failures, and future of the JOC industry.
- From that meeting they created the CJE, where Dr. Dean Kashiwagi sat as the Chair until 2002.
- The objective became to collect performance information on JOC contractors and develop a procurement process (PBPS) that considered both performance and price.
- Disseminate the performance information to assist facility owners in reducing risk and life cycle costs and to motivate contractors to perform.
- Research JOC issues and assist the industry in stabilizing and improving its performance.
- Educate facility owners on the advantage of using JOC process.
- Act as interface between academic community, JOC industry, and potential clients.
- Provide owners with reliable means of performance data and competitive selection between JOC and conventional methods.

CJE surveyed outcomes (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002):

- Conduct an annual performance survey on all JOC contractors.
- Verify theoretical strengths and weakness of the JOC process.
- Identified in 1996, the JOC/SABER/DOC contract performance was 85% better the traditional approach to construction delivery methods.
- 14% of JOC/SABER/DOC contracts were rated as better project delivery method.
- 4. 82% of the delivery or call orders were completed on time.

Performance Based Procurement System (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002):

- Dr. Dean Kashiwagi differentiated the JOC service of the CJE by use of the PBPS.
- The PBPS was first introduced in 1991, which uses computer technology, fuzzy logic, and Information theory to transform construction data into performance information.

- The model was a modified relative distancing model of the "Displaced Ideal Model" introduced by Zeleny (1982).
- The model looks at both price and performance in the selection of a contractor.
- ASU and JOC performance criteria collected on each contractor was weighted.
- When the PBPS was used, a .2 was considered the maximum deviation from the best [baseline], and anything within .2 was used as a prequalification for contractors to bid on IDIQ contracts.

Steps of the combined JOC and PBPS (Kashiwagi & Al-Sharmani, 1999; Kashiwagi & Badger, 1991; Kashiwagi, 2002; Kashiwagi & Mohammed, 2002):

- First identify job
- Put out RFP to JOC contractors.
- Contractors would send in performance information from past projects.
- The PBPS would weight and prioritize the contractors based on scores.
- If the contractors made the pre-qualification, they were allowed to bid on the IDIQ contract.

Federal Government Stream: Overview (1 of 5)

Over 20 years, PBSRG has worked with six major federal government clients [GSA, FAA, U.S.A.M.C, U.S.C.G, U.S.C.O. E., U.S.A.F.]. The best value PIPS model was not fully developed during the time of working with the Federal Government. The best value PIPS and PIRMS were the models used on all projects. The best value PIPS process received most resistance from the federal government. Some of the major problems that occurred were the following (PBSRG, 2014; Kashiwagi, 2014):

- The government's main function is stabilizing society and not create drastic change and become efficient.
- Its personnel have been identified by PBSRG as reflecting this objective, by maintaining a rule/silo MDC based environment.
- Visionaries within the system, eventually leave due to lack of transparency, accountability, and efficiency.

Unsuccessful PIPS implementations had the following characteristics (PBSRG, 2014; Kashiwagi, 2014):

- Non-transparent.
- Performance info is not updated regularly.
- Win/lose silo-based approach.
- Non-expert personnel operating in a low-bid environment.
- Management, direction, and control.
- Reactive.
- Top down approach.
- Little Information Measurement Theory (IMT) education,
- Maximization of employee work.

Successful PIPS implementation must have the following characteristics (PBSRG, 2014; Kashiwagi, 2014):

- A visionary leader who understand IMT.
- Operational visionary who will implement the system.
- Five-year strategic plan, with visionary in place entire time.
- Core team must be selected based on understanding of IMT.
- Follow the advice of PBSRG.
- Amongst participants, the best value environment must be utilized.
- Educate visionary vendors.

Federal Government Stream: Federal Aviation Association (2 of 5)

In 1995, the Federal Aviation Association (FAA) was exposed to the best value approach in a conference presentation given by Dr. Dean Kashiwagi. The program leader from the western region of the FAA heard the presentation and approached PBSRG. The western region of the FAA was tasked to survey hurricane damage in the Pacific region, submit a quick budget, receive approval, and then only receive one year to spend the funding to make the repairs. One of the major problems was the budgets were not fully expended, due to engineers not having the expertise to complete a repair. Another problem with the FAA was a lack of transparency. The procurement agents had no accountability, and were increasing the number of transactions (flights, etc.), that did not add value to the project. Overall, the procurement department did not want to become efficient, and reduce the control and transactions (Kashiwagi, et al., 2004a; Kashiwagi, 2014).

Most of the projects were minor storm damage repairs consisting of waterproofing, road repairs to FAA weather sites in the mountains, repair FAA park areas and surrounding areas. The research partnership program between the FAA and PBSRG lasted three (3) years and delivered $13.3M of storm damage repair services. Overall, the FAA received 100% customer satisfaction with the completed and increased the budget spending from 50% to 100% (Kashiwagi, et al., 2004a; Kashiwagi, 2014).

Lessons Learned (Kashiwagi, et al., 2004a; Kashiwagi, 2014):

- FAA contracting agents were in silos and did not care if FAA benefited from delivered services.
- Vendors were able to plan projects quicker than FAA engineers were.
- A performance database of finished projects was the structure that motivated the vendors to perform.
- FAA design engineers were not as qualified as previously believed.
- The best value system decreased the design engineers’ workloads, and increased the workload of the procurement agents.
- Procurement became a new obstacle.
- The contracting group no longer supported the best value system and terminated PBSRG.

United Airlines

In 1998, Ron Campbell, Project Manager for the UAL San Francisco Maintenance Center, became aware of PIPS [formally PBPS] in 1996, from the FAA's storm damage repair and roofing results from the Phoenix metropolitan area. The (UAL) San Francisco Maintenance Center is responsible for performing high-risk functions 365 days a year. The senior facilities manager is responsible for maintaining $5M square feet of office space, 135 acres of land, 7 hangars, and various other buildings (PBSRG, 2014; Kashiwagi, 2014).

After meeting with PBSRG, the UAL became the first major research client of PBSRG. UAL ran a test on the Dock 7 building which needed the following (PBSRG, 2014; Kashiwagi, 2014):

- Fix roof with many leaks.
- Fix exterior metal that was decaying from poor paint surfaces.
- Fix the unfurnished floor.

Ron was able to procure three (3) contractors to complete the work. The project initially had problems due to the lack of a general contractor. The contractors were stepping over each other, due to no prior notice the work would have to be accomplished simultaneously. With no intervention from Ron, the contractors adjusted their schedule to work on different shifts and complete the work on time. The final results were the following (PBSRG, 2014; Kashiwagi, 2014):

- UAL completed 33 projects.
- Types of projects: General Construction, roofing, painting, flooring, etc.
- UAL implemented PIPS for three (3) years.
- Total award was $15M.
- Overall satisfaction was 100%.
- Quality of work due to PIPS was 100%.
- Finished on time 98%.
- Finished on budget with no change orders 100%.
- In 2004, PBSRG re-inspected the UAL the Dock-7 site, and identified that it had no major signs of deterioration after five (5) years.
- It should be noted the sites are within a couple hundred yards of the San Francisco Bay, which creates salty and damp conditions.

Lessons Learned (PBSRG, 2014; Kashiwagi, 2014):

- Minimizing management, inspection [direction], and control by the user [client/owner], increases quality.
- Client should not direct the contractor to do something the contractor did not propose.
- Identified the best value was the best value for the lowest cost.

- Best value sub-vendors do not need a general contractor to coordinate their efforts.
- Warranties do not always correlate to proven performance.

Neogard Stream- Division of Jones Blair Inc. Corp. Stream (1 of 2)

Neogard is a large sprayed polyurethane foam (SPF) roofing manufacturer in the United States. In 1996, Tom Tisthammer, SPF roofing expert and applicator of Neogard's high performance Permathane material, introduced Mike Steele, President of Neogard, to Dr. Dean of PBSRG. Steele identified Neogard had a problem, due to their industry manufacturers and contractors selling products to clients based on warranties that did not protect or minimize the client's risk. Lawyers wrote up warranties in a way that a client could not accurately identify if the failed roofing systems were due to contractor low-performance or manufacturer mistakes. Performance was not measured for both manufacturing products and contractor installations (Kashiwagi, et al., 2009c; Kashiwagi, et al., 2010b; PBSRG, 2014; Kashiwagi, 2014).

Neogard, though they had a high performing roofing material called aromatic urethane coating for sprayed in place polyurethane foam (SPF) or "Permathane" in short, was at risk due to similar SPF products that had problems with reversion and were installed in the low-bid/low performance environment. Neogard could not figure out how to protect themselves against low performing contractors. When Mike Steele and Dr. Dean met, Dr. Dean proposed Neogard adopt the performance based concepts PBSRG developed. PBSRG was asked to develop a delivery system that would create a win-win for Neogard by partnering high performance contractors and visionary clients. PBSRG ran two tests (Kashiwagi, et al., 2009c; Kashiwagi, et al., 2010b; PBSRG, 2014; Kashiwagi, 2014):

- 1996 Test: Factory Mutual Severe Hail (FM-SH) SPF performance test.
    - PBSRG tested the performance of the Neogard's coating by conducting a FM-SH test with oversized hail.
    - Out of three (3) roof coatings [silicone, acrylic, and urethane Permathane], Neogard’s urethane coating was the only roof that passed the tests, despite the FM-SH documented pass results for the remaining two roofs.
- 1999 Test: FM-SH SPF performance follow up.
    - This test was different from the first test in 1996, by aging the roof samples in a weatherometer, and dropping up to a 4-inch diameter steel ball from 18ft; replacing the original dropping of a 1-3/4 inch diameter steel ball.
    - The permathane roof was identified as a high performance roofing material.
- Alpha Program
    - Due to Neogard being at risk with low-performing contractors installing a high performance roof incorrectly, PBSRG helped Neogard create a performance based contractor-roofing program.

    - The Alpha Program first started by identifying high performing contractors and listing them as the only contractors that can install the Permathane roof.
    - After a few years of running the program, it was modified to increase the high performance of contractors and efficiency of the system by adding in more requirements to be listed as an Alpha program contractor.
    - Some of the requirements are five (5) years' experience with 50 roof installations and 10 permathane installs, become licensed by Neogard, and maintain a 98% satisfaction rating with 98% of roofs not leaking.

Phase II of Best Value PIPS [1999-2004]: Best Value Testing on New/Large Construction Projects

In this section, PBSRG began its first major prototype testing of the best value approach (aka PIPS/PIRMS) on new and large construction projects (PBSRG, 2014):

- 26 clients
- $3M of services
- Major Case Studies and Streams
    - State of Utah
    - State of Hawaii
    - State of Georgia
    - Dallas Independent School District [DSID]
    - Netherlands Stream
    - Federal Government Stream

Phase II of the best value approach identified the following (PBSRG, 2014; Kashiwagi, 2014):

- States of Georgia and Utah initially identified higher performers do not have higher cost.
- The clarification phase is more important than the selection phase.
- If PIPS is used as selection tool only, the client reverts to traditional system of MDC.
- Risk management plan (RMP) and weekly risk report (WRR) are critical in maintaining the accountability of a project.
- Despite PIPS modifications, it will still produce higher performance than the low-bid system.
- Performance information was de-emphasized, and led to the theoretical development that the best value is for the lowest cost.
- Interview criteria became most important.
- Posting of all performance online is critical.
- When MDC decreases, quality increases.
- Selection criteria condensed from 50 to 10.
- Developed method to condense WRRs into one Directors Report.
- PIPS is a mechanism that causes low performers to become high performers.

- Alignment of high performers and best value environment increases production by 100%.
- After Hawaii tests, DIM was replaced by a linear model and the following lessons were learned:
    - Calculations for prioritization had to be simple and dominant or it would not work.
    - Decision-making increases transactions.
    - The shift to simplicity made procurements job easier in making decisions.
    - Many Government sectors became antagonistic against the best value PIPS system. State of Utah ceased from using PIPS, and created a value-based structure that eventually deteriorated.
    - It was identified that the best value should be the lowest cost or provides a dominant reason why it was not.
    - Vendors would not use the PIPS for continuous improvement, because the model would tell them where to improve next, and did not understand the model was designed for such reasons.

State of Utah

In 1999, Richard Byfield, Director of Division of Facilities and Construction Management (DFCM), approached PBSRG to build the Housing Units and Community Center for the University of Utah's 2002 Winter Olympics. This was the first time PBSRG began best value testing on large/new construction projects. Director Byfield, became exposed to the best value PIPS at a fall best value conference at Arizona State University, and a presentation at the National Association of State Facility Managers (NASFA) meeting. Director Byfield implemented the PIPS on five (5) multi-million dollar projects without the clarification phase. It was identified by PBSRG the elimination of the clarification phase would put the projects at significant risk. The following resulted on the projects (Kashiwagi & Byfield, 2002a-d; Kashiwagi & Savicky, 2002; PBSRG 2014, Kashiwagi, 2014):

- 5 total projects and $80M was awarded to 3 different contractors from $85M [7% under budget].
- Projects finished on time & on budget at 80%.
- Client satisfaction was rated at 90%.
- Quality of work from procuring using best value PIPS was rated a 9.2.
- University of Utah's Olympic/Village project won a Federal Design Award.
- Continuous education effort by PBSRG before, during, and after the process was implemented.
- Selected contractors were high performance oriented due to best value PIPS.
- The DFCM was accountable with the progress of each project.

The best value implementation in Utah was cancelled, though Director Rich Byfield was satisfied with the best value system. The construction board came together with contractors who were perceived as high performers and were not awarded a contract.

They created a value-based system that had the following adjustments of best value system (Kashiwagi & Byfield, 2002a-d; Kashiwagi & Savicky, 2002; PBSRG 2014, Kashiwagi, 2014):

- Reduce surveys from 40 to 10.
- Remove blind ratings of the risk assessment plan (RA).
- Stopped collecting performance data from subcontractors.
- Stopped using the nonbiased artificial intelligence prioritization tool (DIM), with a subjective decision of a review panel.
- Continued to not use the clarification period.

PBSRG informed the DFCM and the board, the value-based system would increase the importance of relationships, transforming the risk management process of the best value PIPS, to a subjective award process (Kashiwagi, 2014). Objections to the Value Based System [modified version of PIPS] were the following (Kashiwagi, 2014):

- Contractors no longer submitted risk management and value added concepts.
- Best value awards were increasing in cost, with no justification.
- Same contractors were receiving projects, locking out other local contractors.
- Project still not on time or on budget.

PBSRG identified the VBS eventually was ceased three years from its initial emergence in 1999, and replaced by the traditional design-bid-build low-bid award (Kashiwagi, 2014).

State of Utah tests confirmed the following (Kashiwagi & Byfield, 2002a-d; Kashiwagi & Savicky, 2002; PBSRG 2014, Kashiwagi, 2014):

- Despite modifications to the PIPS [elimination of clarification phase], the system still produces high performance.
- The site superintendent and project manager are key components in large projects.
- Confirmation the clarification period is critical before the award of a contract.
- High performing contractors minimize risk and think in best interest of the owner/client.
- Educating a core team is critical.
- Blind ratings of the Risk management plan will reduce the subjectivity of the committee.
- Education of the system and theory is critical to optimizing the best value system.

The following adjustment to best value PIPS were (Kashiwagi & Byfield, 2002a-d; Kashiwagi & Savicky, 2002; PBSRG 2014, Kashiwagi, 2014):

- The focus of performance information was de-emphasized.
- Led to the theoretical development of the best value for the lowest price, dominant information, and transfer of risk and control to the vendor by forcing the vendor to minimize and mitigate the risk they do not control.

- High performance contractors led to the interview as a main criteria.
- Posting of all project information on the internet increases transparency and reduces blame.
- Criteria minimized to 8 criteria for all contractors.

State of Hawaii/HDOT

State of Hawaii was plagued with poor construction, specifically roofing quality. Gordon Matsuoka and Steve Miwa, of the State of Hawaii Department of Administration and General Services (DAGS), brought the best value PIPS to Hawaii in 1997 and implemented projects from 1998-2002. They wanted to streamline the delivery of construction and minimize the management of overhead, by switching from a low-bid system to the best value system (Kenny, 2008; Kashiwagi & Mayo, 2001, Kashiwagi & Byfield, 2002a-d; Kashiwagi, et al., 2003a-c; Kashiwagi, 2014).

The best value PIPS moved to the University of Hawaii by Charlie Serikawa, project manager, and performed with great success. PIPS was stopped in 2002 by the Governor Linda Lingle's administration, due to an opposing political approach (Kashiwagi, 2014). The State of Hawaii resulted in the following (Kenny, 2008; Kashiwagi & Mayo, 2001, Kashiwagi & Byfield, 2002a-d; Kashiwagi, et al., 2003a-c; Kashiwagi, 2014):

- Delivered approximately 100 roofing and painting projects, 100 school modification projects, and a few waterproofing projects between DAGS and UH.
- Project management on roofing projects were reduced by 80%.
- Average performance rating of roofing contractors was 9.5.
- Design costs were reduced from 11% to 2.5%.
- Delivered all 11 University of Hawaii (UH) projects 100% on time and budget.
- 90% of projects from the UH were ahead of schedule.
- UH change orders decreased by 75%.
- Satisfaction rating of contractors was 9.2.
- No change orders.
- PIPS project managers did 10 times the projects of traditional project managers.
- Roofing contractors did work twice as quickly as contractors who were hired by low-bid.
- Industry in Hawaii was in support of the PIPS.

State of Hawaii tests confirmed the following (Kenny, 2008; Kashiwagi & Mayo, 2001, Kashiwagi & Byfield, 2002a-d; Kashiwagi, et al., 2003a-c, Kashiwagi, 2014):

- Each project should be tracked by a weekly risk report [officially optimized during MEDCOM testing].
- Identifying the alignment of high performance vendors with a best value environment increased production by 100%.
- The greatest risks to the best value PIPS was misunderstanding, opposition to change, and the release of control from the client to the vendor.

- PIPS cannot be done without proper education of the process and theory.
- PIPS implementation must be slow in order to be successful.
- Major risk is political and not construction related. It is founded on simple concepts of logic and common sense and poses a threat to individuals who are not ready for change.
- Identified traditional design-bid-build processes are inefficient, add less value, and end up costing building owners more money in the end.
- Identified low performing contractors under the low-bid system, hired in the PIPS system, performed much better work than the high performing vendors in the low-bid system. This was also identified in the Utah projects, where high prestigious companies were beat out by smaller companies in PIPS, and the smaller companies did high performance work.
    - This was later tested to be true five (5) years later in the Entergy tests.
- Confirmed, even when the PIPS was not fully used it still resulted in higher performance.
- Identified even high performing vendors who were placed in a low-bid environment, reverted to only meeting minimum standards.

The following adjustments to PIPS were (Zeleny, 1982; Kenny, 2008; Kashiwagi & Mayo, 2001, Kashiwagi & Byfield, 2002a-d; Kashiwagi, et al., 2003a-c, Kashiwagi, 2014).

- The DIM mechanism for selection and prioritization was to complex and was finally discontinued after the Hawaii tests.
- The DIM was replaced by a linear matrix mechanism.
- DAGS audit identified too many data points for performance information, and condensed it from over 50 to less than 10.
- Developed a method to document all contractors' performance by compiling weekly data into a director's report [officially optimized during MEDCOM testing].
- Close out surveys were no longer sent out by the procurement department, instead the vendor became responsible for collecting the survey data.

State of Georgia

The Georgia State Financing and Investment Commission (GSFIC), was tasked to deliver a capital construction project, when it heard about the best value PIPS results from the States of Hawaii and Utah, through presentations at the National Association of State Facility Administrators (NASFA). It was later identified by PBSRG that GSFIC was only looking for a procurement model, which would identify high performing vendors and return to the traditional MDC methodology. This led to a PIPS implementation failure, Failure was not due to the best value PIPS system, but the user's understanding of the process. The failure lacked a mechanism that identified what course of action should be taken when a designer over-designs a building, causing contractors to over-bid on the budget. The GSFIC completed two projects using the PIPS, primarily as the selection of high performance vendors (Kashiwagi & Savicky, 2002a-c; PBSRG 2014; Kashiwagi, 2014). Both best value projects identified the following (Kashiwagi & Savicky, 2002a-c; PBSRG 2014; Kashiwagi, 2014):

Environmental technology building constructing a research laboratory:

- Budget was $45M.
- GSFIC selected 3 high performing general contractors, 5 mechanical subcontractors, and 7 electrical subcontractors.
- Bid proposals were all over budget around $54M.
- PBSRG identified through the help of a construction professional who worked on a similar build; (before the bids were submitted) the bids would come in around $52M.
- The Designer and University Board labeled PIPS as the reason for higher costs.
- The GFSIC Project managers decided to re-design and award using the low-bid process, in attempt to avoid protests due to an undefined award process.
- After rebid under the low bid, all proposals were still over budget.
- Georgia Tech had to fire the low-bid contractor, due to their inability to complete a complicated mechanical system.
- In the end, Georgia had to hire a mechanical modification contractor to finish the project.
- The project lasted an additional 300 days with over $1M in increased costs.

Occupational Technology Building at Savannah Technical Institute:

- Learned overdesign problems from previous project.
- Budget was $7.8M.
- Major concern was low-performing contractors within the area.
- Designer was educated to not over-design on the project.
- Once again, contractors over bid around $9M.
- Contractors were selected using a linear model that identified a relationship between price and performance.
- The project did not use a performance based contract, and upon award of construction the state issued a traditional low-bid contract.
- Though the project ran without the best value PIPS, the client was satisfied with the contractor, who would not have been selected without the use of the best value PIPS.
- Due the discontinuing of PIPS projects, contractors were not incentivized to perform under the best value process.

Best value PIPS testing confirmed the following (Kashiwagi & Savicky, 2002a-c; PBSRG 2014; Kashiwagi, 2014):

- Identified as a Quadrant I environment.

- Higher performance does not have higher cost. This was also shown in future case studies of Raytheon, State of Arizona Parks, and Entergy.
- The best value is usually the lowest cost.
- The best value contractor was the best value.
- The selection process is critical in identifying high performing vendors, but the clarification phase of risk/project mitigation/management was identified as just as critical.
- The risk management plan and weekly risk reports are critical in maintaining accountability on a project.
- Risk cannot be mitigated by non-performers.
- Non-performance is caused by the client, client's representatives, and their delivery system, and not the contractors.
- Due to designers not designing to minimize risk, they lack capability of scoping and cost estimating, and tell clients what they want to hear. They must be educated upfront about the ramifications of that course of action.
- BV Expert Equation = Procurement + Project Management + Facilities/Operations Management

Dallas Independent School District

The Dallas Independent School District (DSID) is the tenth largest school district in the United States. It has been using the traditional design-bid-build process [low-bid] for construction procurement. The DISD had a roofing program that was low performing, lacked manufacturer support, and not able to find high performing contractors. Miguel Ramos, DISD visionary, was introduced to PIPS in 2000 and began testing the best value PIPS in 2001. DISD wanted to identify if PIPS could do the following (Kashiwagi & Savicky, 2003; Kashiwagi, et al., 2003a-c; PBSRG, 2014; Kashiwagi, 2014):

- Increase competition and participation of contractors and manufacturers.
- Increase performance and roofing systems.
- Complete projects on time and on budget.
- Provide longer and/or better warranties.

DISD ran 12 PIPS roofing projects totaling $5.2M in services procured that resulted in the following (Kashiwagi & Savicky, 2003; Kashiwagi, et al., 2003a-c; PBSRG, 2014; Kashiwagi, 2014):

- All roofs were awarded at 14% under total budget.
- Warranties were enforceable from 15 - 25 years.
- Contractors meet with unknown or hidden conditions, fixed them in most cases.
- Project and maintenance managers were asked to rate the best value process with the traditional process. PIPS was rated a 10 out of 10, while D.B.B. traditional process was rated a 1.
- Vendor was rated 9.1 (out of 10).
- Both managers wanted to use the best value PIPS again.

- Best value PIPS rated 9 (out of 10) for minimizing direction and control.
- DISD received some of the highest performing roof systems while using PIPS.

Best value PIPS testing confirmed the following (Kashiwagi & Savicky, 2003; Kashiwagi, et al., 2003a-c; PBSRG, 2014; Kashiwagi, 2014):

- High performance does not cost more.
- PIPS increases competition.
- PIPS minimizes management and inspection.
- High performing contractors know how to mitigate risk.

Netherlands Stream (1 of 4)

In the early 2000s, the Dutch construction industry experienced collusion. The majority of general contractors, subcontractors, and material suppliers were participating in price collusion on Dutch construction projects. In 2002, the Dutch government created the Netherland's Parliamentary Inquiry Committee of Construction Fraud (NPICCF). The NPICCF recommended three things (Kashiwagi & Kashiwagi, 2011; Santema, 2011; Rijt & Witteveen, 2011; Kashiwagi, et al., 2012a; Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013):

- First, procurement policies should be uniform.
- Second, public authorities needed to adapt their procurement towards more integrated project delivery models, such as Design Build & Design Build Finance Maintain.
- Third, make use of award criteria based on price and quality (i.e. most economically advantageous tender or "MEAT"). The most specific way to accomplish this was the Best value PIPS model.

After hearing Dr. Dean Kashiwagi present at an international SKEMA conference in Paris France, on the best value approach, visionary George Ang from the Ministry of Housing (Dutch Government), became intrigued with the approach and identified a potential solution to the collusion problems in his country. It is important to notice that George Ang, choose an American academic researcher to solve the construction problem in the Netherlands. George Ang eventually brought Dr. Dean and PBSRG to meet and present too many leaders of the Dutch Government agencies things (Kashiwagi & Kashiwagi, 2011; Santema, 2011; Rijt & Witteveen, 2011; Kashiwagi, et al., 2012a; Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013).

Federal Government Stream: Federal Aviation Association (3 of 5)

After three years disconnected from PBSRG, the FAA reunited for three (3) more years from 2003 to 2005. The FAA wanted to construct the Deer Valley Air Traffic Control Tower using the best value PIPS. The FAA experienced problems during their last three (3) years with PBSRG, mainly due to the following (Kashiwagi, et al., 2004a; Kashiwagi, 2014):

- FAA project manager wanted to use technical knowledge to direct designers.
- FAA PM used MDC, and did not pass risk to contractor.
- One of the elevator contractors was not notified they were successful after the clarification period.
- Directly after the award, the General Contractor (GC) issued a change order for $250K, which should have been identified in the clarification period.
- The GC was a partnering contractor who depended upon relationships and change orders.
- The FAA was identified as a low performance client, due to their inability to adapt to the PIPS philosophy.

In total, the FAA did 55 projects for $4.5M (PBSRG, 2014):

Best value PIPS testing confirmed the following (Kashiwagi, et al., 2004a; Kashiwagi, 2014):

- PBSRG identified the entire organization was not optimal and would require drastic changes to increase the FAA's capability to use the best value PIPS.
- The test validated the importance of the Risk Management Plan and the Weekly Risk Report.
- The test also validated the problem with using PIPS as a selection tool only, which caused reverting to traditional project management techniques of MDC.
- Due to the deliberate disregard for the clarification phase, an immediate change order of $250K, identified the selection phase is not the most important phase.
- The clarification phase is the most important.
- Despite the discontinuing of PIPS at the FAA, they still wrote a letter that showed their appreciation for PBSRG and its best value system.

Phase III of Best Value PIPS [2005-2008]: Best Value Testing on Non-construction Projects

In this section, the best value PIPS evolved tremendously and began testing on non-construction projects. PBSRG learned the major problems that occurred in the construction industry, were occurring in every industry (PBSRG, 2014):

- 46 clients
- $2.8M of services
- Major Case Studies & Streams
    - Baptist Health South Florida System (BHSF)
    - Raytheon Missile Systems
    - State of Minnesota Stream
    - Federal Government Stream
    - Netherlands Stream
    - Education Stream
    - Entergy
    - Schering Plough

- City of Peoria
- Arizona Parks
- Arizona State University Stream
- University of New Mexico

Phase III of the best value approach identified the following (Kashiwagi, 2014):

- Since the past performance information (PPI) is not important, any PPI is acceptable to show prior performance on work.
- Risk Assessment/Value Added (RAVA) plan was standardized; page limits remained at 2 pages, due to no significant value added in 5 page extensions.
- WRR system is simpler than traditional performance tracking.
- Misperception of high performing clients not in a specific region is false.
- The best value vendor is for the lowest cost.
- MDC of clients makes it difficult for vendors to measure performance.
- RMP is the most difficult to implement.
- Contracts have no leverage over poor performers.
- Best value approach is a better mechanism for high performance selection.
- Best value approach transfers risk of client to contractor.
- Best value approach is a more efficient approach to contract management.
- Negotiations only result in increased decision-making.
- Best value vendors must use dominant info to stop client decision-making.
- Best value approach is better than traditional method of procuring food services.
- Best value approach will identify and define the detailed delivery of services of a final product for the client.
- Countries that do not have enough visionaries will not have the ability to sustain or make the paradigm shift toward best value approach.
- Clarification period is simplified and defined.
- Use performance metrics in submittals that can be verified.
- Interview process minimizes client risk.
- Best value approach is sustainable for high performers.
- RMP and WRR are critical to project success.
- Education of core team is critical to successful implementation.
- Political risk is the most dangerous risk to the best value approach.

Baptist Health South Florida System (BHSF)

Research study by Uhlik and Hinze, identified the hospital construction as a poor performer due to only 14% of all projects are completed on time. Hospitals are traditionally the most complex building types to design and construct. The hospital industry performs lower on average in the construction industry as a whole (Whitaker, 2006). For the past 5 years, the BHSF construction managers have identified the best value process may help its capability in assisting BHSF to optimize the level of construction performance it receives. Due to the lack of testing in hospital facilities, implementation was not available (Goodridge, et al., 2006; PBSRG, 2014; Kashiwagi, 2014).

Initially the BHSF identified the best value process implementation as too complex, difficult to learn, lack of interested contractors, too transparent, and fear that performance would cost more. Finally, after a presentation by BHSF construction managers to the CFO, to get permission to test the best value process on their construction delivery, he agreed to test out the best value contractor and not necessarily the lowest bid. The tests were to identify if the process could result in time savings and make the BHSF process more efficient and effective. The BHSF had the following two case studies (Goodridge, et al., 2006; PBSRG, 2014; Kashiwagi, 2014):

IT Warehouse Renovation

- The scope of work was to turn it into a call center.
- Budget was $230K.
- Project was already over delayed by 1 year, and the concern was to have it completed before the call center's move in date.
- 6 contractors bid on the project.
- PIPS criteria was modified to accept any past performance information (PPI).
- The interview was removed due to difficulty of coordinating the BHSF construction managers.
- 3 contractors were moved forward to submit risk assessment plans and bids for a completed project.
- The best value vendor was the lowest cost, which surprised BHSF, who expected to pay more for higher performance.

Miami Lakes Medical Center

- Budget was $6M.
- Due to schedule pressures, the PPI was removed.
- A linear matrix was used to weight the criteria.

Results of both projects

- Both projects awarded the best value vendors.
- Both vendors were the lowest price.
- Both projects finished on time, minus client driven time delays.
- BHSF identified the best value process as producing a far superior product, minimized MDC, was a transparent structure, and took less time.
- The best value process identified the BHSF delivery process and the designer, as the greatest source of nonperformance risk.

Best value PIPS testing confirmed the following: (Goodridge, et al., 2006; PBSRG, 2014; Kashiwagi, 2014).

- Due to the Risk management plan, the interview if need be, could be removed and still produce high performance.
- Contractors are better at preconstruction services than designers.
- Contractors can act in the best interest of the client.
- Designers need to be selected on best value and must document their performance.
- The PIPS is robust and can minimize the risk of a new structure, regardless if the designer has incomplete blueprints.
- Filters were left out of the PIPS, the WRR did not include a RMP, and the PIPS still identified high performance.
- The best value environment is transparent and holds all parties accountable.

The following adjustments to the best value PIPS were (Goodridge, et al., 2006; PBSRG, 2014; Kashiwagi, 2014):

- Since the PPI is not important, any PPI is acceptable to show prior performance on work.

Raytheon Missile Systems

Raytheon Missile Systems wanted to partner with PBSRG to construct a cafeteria for their Tucson, Arizona campus. The original scope was $3.2M for 8,800 (SF), but changed prior to initial project meeting, to 15,500 (SF), keeping the original budget of $3.2M. The due date was December 2005 before Christmas; with two contractors who submitted bids (PPI indicated both were high performance). Contractor 1 bid $6.7M and Contractor 2 bid $6.2M. The original schedule to complete the project was May 6, 2005. Due to designer delays, the project bid proposals were delayed to August 10, 2005. Characteristics of the project was the following (PBSRG, 2014, Kashiwagi, 2014):

- Both contractors submitted way over bid.
- Contractors were asked to bring in their estimators and justify how they arrived at the high costs.
- Both contractors were identified as being honest and estimating accurately.
- Due to Raytheon not willing to budge with the cost, they re-designed the cafeteria and asked the contractors to adjust their cost.
- Both contractors still came in over budget around $4.6M.
- Raytheon decided to further re-design the cafeteria and downgrade significantly.
- Raytheon eventually ceased the PIPS selection and re-bid the project using the low-bid system.

Raytheon had the following results (PBSRG, 2014, Kashiwagi, 2014):

- Project was completed March 2007 - one year behind schedule.
- Total cost was $6.4M.

- 8 change orders resulted in additional $2.34M.
- The Best Value's original cost of cafeteria with no downgrades came in at $6.2M, while the low-bid process and its downgraded cafeteria coming in at $6.4M.
- The low bid [price-based] process cost more than the best value process in the end.
- This was a landmark case study that the best value vendor can be the lowest cost.
- This is also confirmed in the Entergy and States of Georgia, Utah, and Minnesota case studies.

Best value PIPS testing confirmed the following (PBSRG, 2014, Kashiwagi, 2014):
- The best value vendor is not the most expensive.
- When the transparent system of PIPS is fully used, the best value vendor is the best value for the lowest cost.

State of Minnesota Stream: University of Minnesota (1 of 3)

The University of Minnesota (UofM) is one of the largest universities in the United States, with over 50K students. The UofM’s Capital Planning and Project Management (CPPM) was an early adopter of the best value process. The CPPM group is responsible for the delivery of all new and existing facilities on the Minneapolis Campus, which procure on average over 300 projects annually. The UofM's Mike Perkins, Associate VP of CPPM, went to the 2004 best value conference and began best value testing in 2005. The first phase of testing was mainly mechanical, electrical, and roofing areas. The second phase of testing shifted to general construction. Shortly after, the CPPM moved from piloting the best value, to making it a standard procurement program [offered as optional on any project]. Due to the efforts of Mike Perkins, the best value approach became law. The state permitted the use of the best value process as an alternative to the low-bid system, making the best value PIPS the first of its kind. There were three phases in the implementation of the new law (Kashiwagi, et al., 2008a; Kashiwagi, et al., 2010a; PBSRG, 2014; Kashiwagi, 2014):
- In 2007, the law permitted state agencies, counties, cities, and school districts [with 25% highest enrollment] to use best value.
- In 2009, the state includes an increase to school districts with a 50% high of enrollment.
- In 2010, all political subdivisions were permitted to use the best value approach.

Eventually, the UofM's CPPM introduced the best value process into the procurement of the design phases of projects and made it optional for any project. At the time, over 140 designers, engineers, and consultants submitted PPIs to be included in the PIPS design projects. The best value process began spreading to the City of Rochester and Rochester Public School District, who sent representatives to the best value conference, and began best value PIPS implementation in future years (Kashiwagi, et al., 2008a; Kashiwagi, et al., 2010a; PBSRG, 2014; Kashiwagi, 2014).

Federal Government: U.S. Army Medical Command and U.S. Army Corps of Engineers (4 of 5)

The U.S. Army Medical Command [MEDCOM] and U.S. Army Corps of Engineers (COE) work together to meet the hospital construction requirements for military bases across the country. The COE is the procurement agent of MEDCOM, while MEDCOM conducts approximately 250 projects at $300M per year on 26 major facilities (PBSRG, 2014; Kashiwagi, 2014).

MEDCOM was having trouble with managing their performance and approached PBSRG in 2004. MEDCOM initially tested the best value PIPS through the COE on roofing contracts, but the COE was uncomfortable with the level of transparency of the results in the selection process of procuring contractors, so PBSRG proposed to MEDCOM it did not have to use the selection phase of the PIPS, but could use the clarification and execution phases instead. During this period, PBSRG could not convince the COE that PIPS had any value, so they had to convince them the real payoff was in the clarification phases. PIPS was transformed into the Performance Information Risk Management System (PIRMS), which only included the clarification and execution phases of PIPS. The RMP and WRR were key developments in the PIPS process. PBSRG was eventually able to convince the COE to define the RMP in the contract language, because it was critical in the success of the projects. In order to best understand the RMP and WRR, the director's report was refined and activated in 2006. The director's report is the high level summation of each projects schedule and budget deviations. The PIPS transformation to PIRMS proved to be a huge success in the MEDCOM program and resulted in the following (Sullivan, et al., 2005; Chong, et al., 2007; Kashiwagi, et al., 2009d; Sullivan, et al., 2009; Kashiwagi, et al., 2009b; PBSRG, 2014; Kashiwagi, 2014):

- Ran 600+ projects.
- Procured over $1B in services.
- Management was reduced by 33%.
- # of projects on time was 32%.
- # of projects on budget was 52%.
- Average project was over budget by 5% [4% by owner] and delayed by 41% [31% by owner].

Best value PIPS testing confirmed the following (Sullivan, et al., 2005; Chong, et al., 2007; Kashiwagi, et al., 2009d; Sullivan, et al., 2009; Kashiwagi, et al., 2009b; PBSRG, 2014; Kashiwagi, 2014):

- When risk and control is transferred to the contractors, they will minimize the risk of nonperformance.
- Major component of the Performance Information Procurement System (PIPS) is the Performance Information Risk Management System (PIRMS).
- RMP, schedule and WRR can transform a low price environment into a best value environment.

- PIRMS structure forces preplanning, and minimizes the risk the contractor does not control.
- The greatest source of risk is the client's delivery system, micro-management, control, and direction.
- In order for a process to create change, it must be simple and clear, minimize transactions, and have a way to measure the ability of each component to follow the process.

The following adjustments to the best value PIPS were ((Sullivan, et al., 2005; Chong, et al., 2007; Kashiwagi, et al., 2009d; Sullivan, et al., 2009; Kashiwagi, et al., 2009b; PBSRG, 2014; Kashiwagi, 2014):

- PIRMS was developed out of PIPS.
- The director's report was refined to its current state.
- The RMP and WRR were modified and adjusted heavily.

Netherlands Stream (2 of 4)

Because of the presentations Dr. Dean Kashiwagi gave on the best value approach in 2004, two interested parties came to Arizona State University and sent a representative from a the third largest general contractor, Heijmans, and two representatives from the largest buyer of construction services, Rijkswaterstaat, responsible for the majority of water and road construction in the industry. Arizona State University sold two licenses, both to Rijkswaterstaat and to Heijmans, to utilize the best value PIPS technology (Kashiwagi & Kashiwagi, 2011; Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013).

Heijmans later identified a visionary from the Delft University of Technology, outside of the construction management area, from the supply chain and marketing academic area. The visionary was Santema Sicco, who later verified the best value PIPS as the most accurate idea to solve the Netherland's construction problems (Kashiwagi & Kashiwagi, 2011; Santema, 2011; Rijt & Witteveen, 2011; Kashiwagi, et al., 2012a; Kashiwagi, Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013).

Arizona State University licensed a third license with the Dutch visionary from Delft University of Technology and their consulting firm Scenter. The two entities created an agreement, which produced the following (Kashiwagi, 2014):

- Scenter translated the IMT, KSM, CIS, and bv PIPS in Dutch.
- Scenter would proliferate presentations of best value PIPS around the country.
- Scenter would search for Dutch industry visionaries to run best value PIPS tests.
- Scenter would test out the best value PIPS, and identify if it can be replicated.

One of the major construction problems in the Netherlands that eventually led to a landmark best value test of over 1B euros was the road network in the Netherlands. The infrastructure was heavily congested and bottlenecked in 30 different locations.

Traditionally, from idea to new road, it was a 20-year process [see pg.198] (Kashiwagi, 2014).

International Council for Research and Innovations in Building and Construction (CIB)

CIB was established in 1953 as an association, whose objective was to bring internationals and government research institutes in the building sector together for collaboration. CIB members are institutes, companies, and other professional organizations involved in research and testing. PBSRG became involved with CIB when it created the task group (TG) 61 and later the working commission (W) 117 groups. Dr. Dean Kashiwagi initially served as a session Chairperson of Innovation Construction for the Joint Symposium of CIB W55, W65, and W107, Singapore. The TG 61 was approved by the CIB, due to CIB identifying the innovative results of PBSRG in the construction industry. CIB suggested the PBSRG research be created into the task group TG61, to verify it could be successful in further implementation, and if so, would be transformed into a working commission (W117). As stated, the TG 61 was eventually elevated to a working commission, due the worldwide study conducted in 2008 by the TG 61, which identified PBSRG as the only innovative system that has impacted industry in many years (see section 2.5). The partnership between CIB and PBSRG had the following characteristics (Kashiwagi, et al., 2009a; PBSRG, 2014):

- TG 61 was non-traditional and sought experts.
- It set up platforms for PBSRG to enter China, Malaysia, Botswana, and Australia, and expose these countries to the NTRA.
- The success of the TG 61 set up the CIB W117 working commission, which was approved in 2008 by the CIB, to be managed by PBSRG.
- The CIB W117 has become a critical piece to the strategic "Patton" approach of PBSRG, to actively publish peer reviewed data that identifies the impact of the best value testing in both construction and non-construction industries.

Entergy Corporation

Entergy is an energy company that provides electricity to the Southern United States [Texas, Louisiana, Arkansas, and Mississippi]. Entergy became a research partner of PBSRG, to implement the best value approach into their facilities group capital projects program. The capital projects included the delivery and management of construction and renovation of buildings over its southern region. Entergy identified the following (PBSRG, 2014; Kashiwagi, 2014):

- Total best value implementation was 9 months.
- Total # of projects was 6.
- # of times best value was lowest price was 2.
- Total number of projects completed was 2.
    - Both projects had 100% satisfaction with 0% change orders and delays.

New Orleans Magnolia St. Building case study results (PBSRG, 2014; Kashiwagi, 2014):

- Simple office renovation.
- 2-month deadline.
- Budget was $250K.
- Best value process took 5 weeks to educate contractors through award of contract.
- Best value bidder's cost was $163K, which was 59% lower than the highest bidder.
- Project came in on budget.
- Additional cost was added due to increase in scope by client.
- Customer satisfaction was high.

Entergy Facilities Management Group Survey case study results (PBSRG, 2014; Kashiwagi, 2014):

- Using best value decreased project management by 17%.
- Best value process selected highest performer that was 100% on time, and received high customer satisfaction and no change orders.
- Issues were caused by client.

Best value PIPS testing confirmed the following (PBSRG, 2014; Kashiwagi, 2014):

- The best value process performance tracking system, WRR, is simpler and more accessible than traditional performance tracking systems.
- WRR's summarized final report is effective.
- The education and understanding of best value of top management along with the project managers, significantly increase's the effectiveness and accountability.
- The WRR system effectively holds contractors accountable, which they reciprocate with the client, ensuring the system runs efficiently.
- The WRR helps reduce the management of the project [meeting, planning, coordination's, etc.] by 17%.
- The misperception of clients that high performing contractors are not available in certain areas of the country is false. This was also confirmed in the Baptist Health South Florida test cases.
- The best value PIPS can identify the best value for the lowest price.
    - High performance should not cost the most, if the contractor is high performing and efficient.

Schering Plough

Schering Plough is a top 20 pharmaceutical company that procures over $50M worth of services a year. It became a research partner of PBSRG to help alleviate their difficulty with current outsourcing methods. It used the best value PIPS to procure facility services [laundry, landscaping, and scales and measurements]. One of the major problems it had with using outsourced vendors was not meeting the client's expectations. It was identified the vendors were not motivated to improve efficiency. Schering Plough had the following results (Kashiwagi, et al., 2007; PBSRG, 2014; Kashiwagi, 2014):

- Ran best value PIPS on 12 outsourcing services within 2 years.
- Total cost savings of all services was $3.4M (nearly 50%).
- Client satisfaction with traditional process was 5 (out of 10)
- Client satisfaction with the best value process was 9 (out of 10).

Laundry service case study results (Kashiwagi, et al., 2007; PBSRG, 2014; Kashiwagi, 2014):

- First complete test, which was completed by using the best value PIPS.
- Performed for the outsourcing of laundry services in three locations of New Jersey.
- Service provider was not satisfied with current vendor due to constant delivery mistakes, billing delays, and vendor could not collect any necessary data for the vendor.
- Previous contract cost was $1.6M, and the new contract was $840M.
- New contract under the best value PIPS barcoded all garments, created a 100% electronic reporting, and provided continual measurements throughout contract.

Best value PIPS testing confirmed the following (Kashiwagi, et al., 2007; PBSRG, 2014; Kashiwagi, 2014):

- MDC of client made it difficult for vendors to monitor and analyze their own performance.
- The PIPS is robust. The risk management portion was not fully adhered too, yet PIPS still performed.
- When competition is based on value [performance and price], the best value is often the lowest price.
- The pre-planning and risk management processes are the most difficult to implement.

City of Peoria

Up until early 2000s, the City of Peoria was required by law, to only award projects based on the lowest cost. This priced based environment resulted in 75% of the price-based contracts not delivering on time and had a 75% change order rate with a 20% customer satisfaction rating. In 2004, the City of Peoria became a research partner of PBSRG, to begin testing the best value PIPS. Due to the law change in the early 2000s, the City of Peoria could not identify alternative project delivery methods to select construction firms. Despite the laws, the City of Peoria was allowed to use the PIPS process under the Design-Build and Construction Manager at Risk delivery process. This allowed the City of Peoria to choose a contractor based on performance and not price. The City of Peoria resulted in the following (Kashiwagi, et al., 2004b; Sullivan, et al., 2006; Sullivan, et al., 2010; PBSRG, 2014; Kashiwagi, 2014):
Peoria implemented PIPS on 55 projects, totaling over $389M from 2004 - 2009.

- Overall change order rate was reduced by 99%.
- Project delay was reduced by 77%.
- Customer satisfaction was increased by 395%.

Rio Vista Project case study results (Sullivan, et al., 2010):

- The project was to design and build a recreational park and facility.
- Out of 7 bid proposals, the best value vendor came in under budget at $19.4M from $20M budget.
- Project met city's expectation and received the Construction Owners of America Top Gold Award for Project Leadership 2007.

Fire Station #7 project case study results (Sullivan, et al., 2010):

- The project was to build a fire station.
- The design and construction teams who were selected also received the highest scores for interview and RAVA plans.
- The project was awarded at $3M, which was under the project budget and met the client's expectations.
- The project won several awards including the Gold Medal Design Excellence Award from the Fire Chief Magazine in 2007, and the Design Excellence Merit Award from Fire Rescue Magazine in 2007.

Lessons Learned (Sullivan, et al., 2010):

- It is important to have proactive education of the core group for successful best value PIPS implementation.
- PBSRG identified the implementation of PIPS should be slow, and begin documenting results on projects that are small and have a completion within the year. This allows the organization to get a feel for the process. The City of Peoria was not able to do this, since their projects were large scale and took over 1 year.
- Due to the success of construction implementations, the City of Peoria moved to the Architectural and Engineering (A/E) services that had successful projects, but caused the process to be attacked by contractors who were not winning the best value contracts. This caused political risk that eventually kept the City Peoria from running the best value PIPS in the A/E area.
- The City of Peoria's traditional interview period was a presentation period, where the vendor would send their marketing personnel to give a presentation on past projects they have completed. During the PIPS interview process, the City of Peoria was not familiar with interviewing key personnel (people working on the project). After several firms being interviewed, the City of Peoria realized, it is important to let the vendor know only key personnel are interviewed and not marketing people who had no clue why there company was selected.
- The WRR became critical to documenting schedule and cost deviations.

Best value PIPS testing confirmed the following (Kashiwagi, et al., 2004b; Sullivan, et al., 2006; Sullivan, et al., 2010; PBSRG, 2014; Kashiwagi, 2014):

- High performing users and project managers do not want to give up the best value process when they are exposed.
- The RMP and WRR systems are critical to project success.
- Political risk is dangerous to the successful implementation of the best value process.
- Education of the core team is critical to successful implementation of the best value process.

The following adjustments to the best value PIPS were (Kashiwagi, et al., 2004b; Sullivan, et al., 2006; Sullivan, et al., 2010; PBSRG, 2014; Kashiwagi, 2014):

- The PPI traditionally required vendors to send surveys to their past clients and the clients would have to return the surveys to the City of Peoria. Due to the massive influx of surveys, it adjusted to the vendors collecting all their surveys and documenting the results. This resulted in less transactions of management.
- The RAVA plan template was not standardized, allowing vendors to make their own RAVA, which they would fill it up with a mixture of pictures, margins, and color coating. After procuring several projects, the City of Peoria began to identify who vendors were, despite the selection process being a blind rating. This caused bias to enter the selection process. Due to this being a problem, PBSRG was requested to adjust and standardize the RAVA.
- The RAVA's page limit was increased from 2 pages to 5 pages. Overall, the extra pages did not add value. Due to vendors filling up the extra pages with marketing material, it was reverted back to a 2 page limit.

Arizona Parks

Arizona Parks became a research partner of PBSRG to test the best value PIPS on two projects: waste water treatment/restrooms for Slide Rock State Park, and a CM at the Risk New Visitor Center at Picacho Peak State Park (PBSRG, 2014; Kashiwagi, 2014).

Slide Rock State Park case study results (PBSRG, 2014; Kashiwagi, 2014):

- 9 proposed on contract and the best value vendor was selected.
- The best value vendor priced the job 63% over budget or $1.9M.
- After adjustments, the price was reduced to $1.7M or 41% over budget.
- No new case study data exists.

Picacho Peak State Park case study (PBSRG, 2014; Kashiwagi, 2014):

- Budget was $950K.
- All 4 vendors proposed in their RAVA plan the design was over budget.
- The best value vendor was selected and priced over budget by 38%.
- With this knowledge, the client went forward with the best value vendor into the clarification period.

- The best value budget was $1.3M or 38% over budget.
- Due to the vendor identifying over designs and errors, he was able to reduce his price to $1.17M or 23% over budget.
- The client was able to find $200K more, bringing the best value vendor's budget to 1.7% over.
- PBSRG advised the client to find an additional $20K to meet the vendors cost.
- The client decided the best value vendor should come down in price and meet the client's budget.
- PBSRG identified negotiations are not best value.
- The client decided to remove the best value vendor and select the second ranked vendor who was not a high performance vendor [2nd in interview, 3rd in RAVA, and lowest PPI score].
- Though PBSRG identified this will add additional risk, the client moved forward with their decision.
- New contractor initially proposed over 47% than original budget and 8% higher than the best value vendor.
- After negotiations, the selected contractor submitted a final cost of $1.2M or 9% over budget.
- At last tracking by PBSRG, an additional $75K was added to the budget in change orders.

Best value PIPS testing confirmed the following (PBSRG, 2014; Kashiwagi, 2014):

- Negotiations only result in increased risk and decision-making.
- The client's decision-making causes risk.
- The best value vendor must use dominant info to stop client decision-making.
- Client's knowledge does not exceed the best value vendor's knowledge.
- The best value process does not increase cost.

Arizona State University Stream: Software & Dining Services (1 of 2)

Arizona State University (ASU) has been the largest user of the best value PIPS in the United States, totaling around $1.7B and 16 projects completed. It was also the gateway for PBSRG to test the best value process on non-construction projects. Many years earlier in 1996, Dr. Dean Kashiwagi initially presented the best value process to Ray Jensen, Associate Vice President for University Business Services at ASU, with no success due to an immature PIPS structure and perceived common practiced principles by ASU. Ten years later, in 2006, Dr. Dean presented the improved PIPS and Ray Jensen began testing immediately. In the five years of PIPS implementation, Ray identified the updated PIPS from the version 10 years previous as (PBSRG, 2014; Kashiwagi, 2014):

- Better mechanism for selecting vendors.
- Reduces need for detailed scopes of work.
- Transfers risk and decision-making to contractor.
- Provides efficient approach to contract management.

- New desire to integrate the best value approach within the ASU procurement processes.

Software IT Project Case Study (Sullivan, et al., 2007):
The first non-construction test PBSRG conducted was a small software project. PBSRG identified the IT services industry has been plagued with non-performance with over 50% failure rate. Until this project, best value was solely implemented in the construction industry. The characteristics of the software IT project was the following:

- Arizona State University wanted new IT budgeting and planning software.
- It was to be used on all campus expenditures for a population of 65,000K students and an annual budget of $1.31B.
- Software needed to be robust and operate immediately.
- No time for education of vendors on best value process.
- Client management did not buy in to best value process.
- Minimal time was given to collect PPI.
- Full traditional RFP was used instead of best value RFP.

Software IT Project Case Study Results (Sullivan, et al., 2007):

- 72% non- performance rate.
- Project fell apart immediately with $78K change order.
- No use of WRR by vendor.
- Vendor eventually left the country in the project to work with other clients.
- Project was delayed 220%.

Lessons Learned

- Research was the first test in non-construction services.
- Traditional software proposal contained mostly marketing material.
- Performance measurements is not a standard practice in the IT industry.
- Education of the best value approach is critical.
- Contracts contain no leverage over poor performing vendors.
- PBSRG did not view this project as a best value failure.

ASU Food Services Project Case Study (Michael, et al., 2008; PBSRG, 2014; Kashiwagi, 2014):

ASU decided to develop the largest university food services contract in the United States at the time, and asked PBSRG, who had no prior experience in food services, to help. The project was estimated at $400M and a potential 10-year contract. The contract was to service the 65K+ students, faculty, and staff at ASU, and the incumbent vendor had been contracted for the past fifty years. In total, three contractors submitted bid proposals. Despite certain committee members scoring each vendor’s RAVA and interviews subjectively, the high performance vendor was still selected. The best value vendor was awarded $85M, which was $32M above the incumbents. The total time to procure the best value vendor was 46% faster [260 to 140 days].

ASU Food Services Project Case Study Results (Michael, et al., 2008; PBSRG, 2014; Kashiwagi, 2014):

- Amendment to contract in year two was conducted due to challenges in year one [bad debt risk, transition risks, poorly written financial contract language, and Memorial Union (campus building) fire].
- Contract was extended past 10 years to 16 years.
- Contract added 3 additional campuses.
- Sales up to 2012 has shown an increase on average by 15%.
- Commission up to 2012 has shown an increase by 20%.
- ASU management was reduced by 79%.
- Student satisfaction was 37% in first year and increased by 1-9% yearly.
- The running of best value PIPS on the selection and delivering of food services at ASU is a landmark event in the history of procurement.
- Best value PIPS contact changed the operations of the food services industry.
- ASU received a food services contract that was better than any other food services contract in the United States.

Lessons Learned (Michael, et al., 2008; PBSRG, 2014; Kashiwagi, 2014):

- The vendor could have been more successful if he could have increased the level of transparency.
- Vendor could not identify the return on investment to ASU in dominant terms.
- Vendor was not able to act in the best interest of ASU.
- The vendor's representative made decisions which caused transactions.

Best value PIPS testing confirmed the following (Sullivan, et al., 2007; Michael, et al., 2008; PBSRG, 2014; Kashiwagi, 2014):

- Contracts have no leverage over poor performing vendors.
- The best value process is a better mechanism for the selection of high performing vendors.
- It is difficult to maintain transparency without dominant information.
- Best value transfers risk of client to contractor.
- Best value is a more efficient approach to contract management.

University of New Mexico

Due to the immediate success of Arizona State University's Dining services, the University of New Mexico (UofNM), wanted to implement the best value PIPS on their own dining service contract. The selection process had very similar final ratings of the top two vendors. The best value vendor on this occasion was $8M over the second rated vendor. Similar to Arizona State University’s Dining Services, UofNM’s vendor had a hard time dominantly explaining his plan, while the client had a hard time releasing full control to the vendor. Both parties needed constant guidance and education to ensure the best value PIPS process was being followed. The original budget for dining services was estimated at $140M for eight years. The Chartwells vendor, selected best value vendor, was identified by competitors that he would not be able to provide the financial results they have offered in their bid proposals. Rudy Simchak, project manager of Chartwells, purposefully choose the most expensive vendor, in order to raise the standard of the dining service, to cater to more than just poor students. The University of New Mexico's Dining Service project had the following results (PBSRG, 2014; Kashiwagi, 2014):

- Total sales of dining services went up 9%.
- Commissions increased 57% over prior year.
- $2.4M in capital was invested in Year 1.
- Capital was 20% higher than the runner up vendor was.
- Food court became the most popular space for students.
- Rudy had a backlog of six of the most popular food vendors in the local area, on a waiting list to come on campus.
- Rudy's model was used in another winning best value proposal at Idaho State University.

Best value PIPS testing confirmed the following (PBSRG, 2014; Kashiwagi, 2014):

- Best value PIPS is dominantly better than the traditional method of procuring food services in universities.
- In a best value environment, where the vendor has full control, dining services will have high performance.

Phase IV of Best Value PIPS [2008-2011]: PIPS/PIRMS Maturation

In this section, PBSRG has fully developed and matured the PIPS/PIRMS models. PBSRG fully understands the issue for non-performance in industry and has accomplished its goal of creating a model that can modify behavior of non-performers and turn them into performers, without the use of MDC. PBSRG has identified the problem does not belong to any single industry, but all industries. Non-performance is not a technical issue, rather, a capability level that the majority of people are not able to identify and solve, without the use of expertise (PBSRG, 2014):

- 43 clients
- $3.7M of services
- Major Case Studies and Streams
    - Arizona State University Stream
    - University of Botswana
    - Netherlands Stream
    - State of Minnesota Stream
    - Federal Government Stream
    - State of Oklahoma
    - Neogard Stream

  - Western States
  - Education Stream

Phase IV of the best value approach identified the following (Kashiwagi, 2014):

- PBSRG is no longer in a major role of developing the PIPS model.
- PBSRG is now focused on the education and assisting high performance vendors and other supply chain participants who have the capability to implement the system.
- When client cannot release control of project, quality decreases.
- When the vendor does not take control of their project, it become difficult to gather project performance and integrate vendor into the clients organization.
- Transparency through dominant metrics will increase accountability.
- The price-based environment also exists outside the United States.
- Countries that do not have enough visionaries will not have the ability to sustain or make the change of paradigm to best value.
- The best value approach can be tested and successfully implemented in other countries.
- The clarification phase was finally defined.
- Employees work in silos and their main goal is survivability, and systems like the best value PIPS is a threat to employees in large organizations.
- PIPS process does not take longer than normal procurements.
- Clients can identify high performers without technical expertise.
- PIPS process minimizes vendor's ability to protest.
- PIPS process allows smaller vendors to perform work.
- When core teams are visionaries, PIPS will run efficiently.
- Interview process minimizes client risk.
- Bid price and the actual cost of service might not be related.
- Technical specifications are used, but performance measurements are most critical.
- Transfer of risk is disruptive to vendors, due to them being reactive and depending on client to MDC.
- Vendors require assistance to learn how to be proactive and minimize risk they do not control.
- The best value approach is a sustainable practice for high performers.
- Transparency identifies high performance and reduces decision-making.
- The best value approach is more than a delivery method, but a way to decrease inefficiencies in any organization or industry.
- Best value process is open, fair, and transparent.
- Interviews should be shortened to 25 minutes instead of 1 hour.
- Vendors are capable of measuring and documenting their performance.
- Education of IMT/PIPS is very important in service industries.
- Client's technical personnel may bring the greatest risk to delivery of the project.

Arizona State University Stream: University Technology Office (2 of 2)

For the previous two years, Arizona State University (ASU) had been trying to define the networking services with no success. Finally, ASU's Technology Office (UTO) approached PBSRG to help by implementing the best value approach. Characteristics of the networking services project was the following (PBSRG, 2014; Kashiwagi, 2014):

- The UTO was very control oriented.
- PBSRG team knew nothing about IT networking.
- The ASU IT network is one of the largest university networks in the United States.
- It services over 65K students on 4 campuses.
- One vendor proposed on the contract [Qwest, now known as CenturyLink].
- Due to this outcome, the requirement was identified as to difficult, risk was high, and client's system may not be the best to work with.

IT Networking Case Study Results (PBSRG, 2014; Kashiwagi, 2014):

- As of 2013, total cost savings was over $2M (cost reduced to $9.8M/year from original cost of network at $12.29M/year).
- Baseline outages were not tracked before vendor. Vendor identified 37 outages a year in the first year, and has reduced it to 11.
- Vendor identified outages were due to client.
- % uptime was increased from 99.802 to 99.998, which is really high performance in IT networking.
- Customer satisfaction was 3.81 (out of 4).
- % network supported increased form 89% to 99%.
- % 1Gb-Wired connections increased from 57% to 96%.
- Wireless increased from 9% to 92%.
- Increased ratio of IT spending from 6/94 (new/old) to 56/44 (new/old)

Lessons Learned (PBSRG, 2014; Kashiwagi, 2014):

- Client (ASU) did not want to release control and minimize direction.
- The vendor did not take control and tell the client what is needed and what the requirements are.
- Difficult to get the performance measurement to identify performance.
- Difficult to integrate the vendor into the client's organization.

Best value PIPS testing confirmed the following (PBSRG, 2014; Kashiwagi, 2014):

- Best value PIPS will identify and define the detailed delivery of services or final products the client will receive.
- Transparency through dominant metrics will increase the level of accountability.

University of Botswana

For many years the United States, United Kingdom, and European educators, consultants, and practitioners have been working in Botswana, Africa to implement a traditional contracting/delivery system with no success. Due to the unsuccessful implementation of the traditional approach, a new organization, Government Implementation Coordination Group (GICO), was created in attempt to solve the current industry problems. In fall 2008, the University of Botswana, through the U.S. State Department sponsored Dr. Dean Kashiwagi, Director of PBSRG, through the Fulbright Program, in attempt to test the non-traditional contracting/delivery system (best value PIPS). GICO first wanted to bring the best value approach to the University of Botswana's (UB) Masters of Project Management (MPM), made up of personnel of large organizations in Botswana, then to other organizations such as the U.S. Embassy and Bank of Botswana. Part of Dr. Dean Kashiwagi's assignment was to increase the effectiveness of the MPM program by convincing the UB and MPM they needed to shift paradigms to best value, and implement a mentor program between PBSRG and MPM, to create a sustainable implementation of best value in Botswana. Some of the problems PBSRG faced were overcoming traditional thinking of the UB and MPM personnel, by convincing them to change paradigms to best value. The MPM only graduated 10% of students, and the students were treated like students and not professionals, which created a reactive environment (Kashiwagi, & Kashiwagi, 2009; Adeyemi, Kashiwagi, & Sullivan, 2009; PBSRG, 2014).

Botswana Case Study Results [within a span of 4 months] (Kashiwagi, & Kashiwagi, 2009; Adeyemi, et al., 2009; PBSRG, 2014):

- Ran tests with U.S. Embassy and Bank of Botswana.
- Ran 7 PIPS tests.
- Secured $25K in two research grants.
- Gave 9 major presentations.
- Partnered with 15 MPM graduate students to write a thesis plan using PIPS.
- Assigned MPM 655 course [Assessment, Monitoring, and Alignment] and transformed it into a research-based class using IMT/PIPS.
- Implemented research in 4 MPM courses.
- Mentored 3 UB lecturers on research.

Lessons Learned (Kashiwagi, & Kashiwagi, 2009; Adeyemi, et al., 2009; PBSRG, 2014):

- Identified the Botswana PM industry uses a price based award, and uses MDC.
- The local skill level was low and performance for both foreign and local contractors was poor.

Best value PIPS testing confirmed the following (Kashiwagi, & Kashiwagi, 2009; Adeyemi, et al., 2009; PBSRG, 2014):

- The best value approach can be successful tested and implemented in other countries.
- Countries that do not have enough visionaries will not have the ability to sustain or make the change of paradigm to best value.

Netherlands Stream (3 of 4)

In 2009, led by Rijswaterstaat organization visionaries Wiebe Witteveen and Carlita Vis, using the expertise of Sicco Santema and Jeroen van de Rijt of Scenter with support of PBSRG, the Netherlands delivered a nearly $1B euro infrastructure project. This became the largest best value PIPS project in the world. The Dutch Ministry of Infrastructure and Environment identified 30 major bottlenecks that needed to be expanded to reduce the severe traffic. Rijkswaterstaat selected 16 projects to meet the deadline of 3 years [Jan 1 2009 - to May 1, 2011] (Kashiwagi & Kashiwagi, 2011; Santema, 2011; Rijt & Witteveen, 2011; Kashiwagi, et al., 2012a; Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013).

Netherlands Case Study Results (Kashiwagi & Kashiwagi, 2011; Santema, 2011; Rijt & Witteveen, 2011; Kashiwagi, et al., 2012a; Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013):

- 30 projects started, and ten were completed by May 2011.
- Scenter and Rijkswaterstaat successfully implemented the best value PIPS.
- 100% increase in profits.
- 90% decrease in owner project management.
- Traditional procurement costs were reduced by 50%.
- 95% of project deviations were caused by client.
- 14 of 30 projects were completed, surpassing the goal of 10.
- Average completion time of projects was reduced by 25%.
- Traditional research approach of theoretical research, possible testing, and implementation of test results would not have led to a successful Netherlands test.
- Traditional approach is too slow and does not focus on the alignment of expertise.

State of Minnesota Stream: University of Minnesota, Intermediate School District 287, and City of Rochester (2 of 3)

In October of 2009, the UofM’s Capital Planning and Project Management (CPPM) made the best value PIPS the standard method of procurement. Many other organizations began implementing the best value PIPS, such as the Rochester Public Schools, Intermediate School District 287, City of Rochester, and Hennepin County. Shortly after the implementation of the UofM, James Kelly, Coordinator of Design and Construction Services at Rochester Public Schools, attended a best value conference in 2008. The

District tested its first PIPS project on a school renovation and upgrade project (PBSRG, 2014; Kashiwagi, 2014).

Visionary Tom Schulz, from the Intermediate School District 287 (ISD 287), became exposed to the best value process when he attended the International Facilities Management Association's World Workplace Conference and heard Dr. Dean Kashiwagi speak about best value. The school district completed one of the largest best value tests in the following year. The ISD 287 constructed the North Education Center in Plymouth, MN. The District also tested PIPS on the selection and delivery of the Technology Systems and the Demountable Wall Systems (PBSRG, 2014; Kashiwagi, 2014). ISD 287 had the following results (PBSRG, 2014; Kashiwagi, 2014):

- Total number of projects was 3.
- Total award cost was over $29.5M.
- Percentage of awards to best value contractors was 33%.
- Average contractor change order rate was 5.1%.
- Average contractor cost increase was 0%.
- Average client delay rate 5.8%.
- Average client cost increase rate .4%.
- Customer satisfaction was 9.7 (1-10).
- Client rating was 8.9 (1-10).

Visionary Richard Freese, from the City of Rochester, was exposed to the best value process by attending the best value conference in 2008, and began implementing the first PIPS project on a Design-Bid-Build new Public Works and Transportation Operations Center. At this point, it was the largest PIPS test in the State of Minnesota (Smithwick, & Kashiwagi, 2012). The public works project had the following results (Smithwick, & Kashiwagi, 2012):

- Total cost was $25.6M.
- 11% less than the total estimated budget.
- Contractor change order rate was .1% and delay rate of 6.8%.

Visionary Judy Hollander, from Hennepin County, was also exposed to the best value approach and developed a strategic plan to achieve an education core group, educate county staff, develop best value methodology standard in the county, and ensure all vendors and consultants and staff participating in best value projects fully understood the process. Hennepin County has over a 1.1 million population, making it the largest county in State of Minnesota (PBSRG, 2014; Kashiwagi, 2014).

Best value PIPS testing confirmed the following (Kashiwagi, et al., 2008a; Kashiwagi, et al., 2010a; PBSRG, 2014; Kashiwagi, 2014):

- Best value does not cost more with 23% below average proposal cost.
- The best value was the lowest bidder on 54% of projects, confirming the best value is the best value for the lowest cost.

- The selection [formerly pre-planning phase] makes the entire project more efficient. 264 (out of 300) projects (88%) incurred 0% contractor cost increases.
- High performing contractors know how to mitigate risk.
- Non-value adding transactions increase cost. Vendors documented an increase of profit margins by up to 10% with an average of 11 contractors surveyed at 4.5%.

The following adjustments to the best value PIPS were (Kashiwagi, et al., 2008a; Kashiwagi, et al., 2010a; PBSRG, 2014; Kashiwagi, 2014):

- Proposal must have verified performance information with any high performing claim.
- Submittal of identifying risk vendor does not control [also done with MEDCOM].
- Minimization of past performance information [also done in State of Utah]
- Simplified the clarification phase to clearly identify "what's in" and "what's out" and how vendor will mitigate risk they do not control. This lead to the theoretical advancement that all control and risk is transferred to the vendor.

Federal Government Stream: General Services Administration (5 of 5)

The GSA is the largest buyer of non-military services in the United States, and it is a large management based organization. PBSRG partnered with a GSA administrator in the Kansas City area. PBSRG identified two visionaries, a procurement officer, and a project manager. PBSRG believes if given enough time, these two individuals could have positively affected the GSA culture. GSA partnered with PBSRG for two years, but did not make it to the third year. One of the major problems was due to the management structure embedded in the organization. The culture was top down, control oriented, lacked innovation, and lacked performance measurements, though many programs were implemented to help change the system. The GSA administrator, was not supported by his own personnel, and became a constraint for the best value PIPS to become established. Due to the GSA administrator's lack of support of his project manager, his project manager left the organization. Once the project manager left, the remaining personnel discontinued the PIPS effort (Meyer, et al., 2010; Meyer, et al., 2011; Kashiwagi, 2011). The GSA had the following results (Meyer, et al., 2010; Meyer, et al., 2011; Kashiwagi, 2011):

- Total awarded cost was $10M.
- Vendor delay: 16%.
- Owner delay: 19%.
- Vendor cost increase: .1%.
- Owner cost increase: 8%.
- Vendor closeout rating: 8.1.

Tests confirmed the following (Meyer, et al., 2010; Meyer, et al., 2011; Kashiwagi, 2011):

- MDC of any organization is detrimental to the overall success of implementing the best value approach.

- When there is a lack of visionaries, the best value approach has little success.
- When top management is not in support of the best value approach, it is hard to implement.

The following adjustments to PIPS were (Meyer, et al., 2010; Meyer, et al., 2011; Kashiwagi, 2011):

- Clarification phase was defined and modified to be the following:
    - Vendor should deliver a scope of what's in and out, detailed schedule including risk activities that lack information or vendor does not control, a RMP and WRR that includes a milestone schedule, cost and time deviation, identification of risk and cost/time deviations, a RMP and performance metrics.
- Listen to the vendor during the clarification period before identifying risk.
- Use performance metrics in selection submittals.
- Do not request scope submittals.
- Program should be voluntary and not compulsory.

Best value PIPS testing confirmed the following (Meyer, et al., 2010; Meyer, et al., 2011; Kashiwagi, 2011):

- PBSRG is no longer in a major role of developing the PIPS model.
- PBSRG is now focused on education and assisting high performance vendors and other supply chain participants who have the capability to implement the system.
- The following IMT validations were identified from the 6 major Federal government case studies:
    - Larger organizations are more bureaucratic; rules oriented and stabilize environments to stop change.
    - Employees work in silos and their major goal is their survivability in the organization.
    - Efficient systems like PIPS are a threat to employees in large organizations.
    - Requirements to implement the best value PIPS is a fully developed PIPS system, visionaries in leadership and operational roles for at least 5 years, strategic plan, and a plan of succession that includes education.

State of Oklahoma

John Morrison, State Architect, was introduced to the best value PIPS at a National Institute of Governmental Purchasing (NIGP) meeting. The State's construction and properties division (CAP), part of the Department of Centralized Services (DCS), shortly after became a research client of PBSRG. The CAP introduced PBSRG to the Purchasing division of DCS, who began running the best value PIPS immediately. Oklahoma was a great client, with the least number of problems and best executed PIPS testing. Oklahoma received extensive training before implementation, and technical experts were not employed to manage projects. The users of the best value PIPS understood the paradigm shift, and was the first client to use the best value PIPS on both construction and non-construction services (Kashiwagi, & Morrison, 2012; PBSRG, 2014; Kashiwagi, 2014).

PBSRG Objectives (Kashiwagi, & Morrison, 2012; PBSRG, 2014; Kashiwagi, 2014):

- Train all purchasing and construction project managers in the best value PIPS.
- Use best value PIPS as primary procurement process for all projects that had risk.
- Educate all agencies and improve efficiency of organizations.

State of Oklahoma Case Study Results (Kashiwagi, & Morrison, 2012; PBSRG, 2014; Kashiwagi, 2014):

- Total number of years were 5.
- Total number of awarded procurements was 19.
- Estimated value of best value procurements was $137.7M (out of a $208.7M budget).
- Number of services was 13.
- Changed state construction law to allow PIPS on construction projects.
- # of projects given to lowest bidder was 12.
- # of cancelled projects was 6.
- Customer satisfaction was 9.5%.
- Cost savings were $15M.
- % on time and on budget were 100%.
- Protests were reduced to 0.

Lessons Learned (Kashiwagi, & Morrison, 2012; PBSRG, 2014; Kashiwagi, 2014):

- Computer to Plate system project identified that PIPS creates a structure that supports the client.
    - PIPS requires vendors to satisfy the client before the award is made.
    - Process requires vendors to differentiate themselves.
- Light Bulb and Fixture Contract identified how PIPS forces vendors to measure and show performance.
    - The process minimizes decision-making.

Best value PIPS testing confirmed the following (Kashiwagi, & Morrison, 2012; PBSRG, 2014; Kashiwagi, 2014):

- Clients that listen to PBSRG experts will have higher performance.
- PIPS process does not take longer than normal procurements.
- Client can identify high performers without technical expertise.
- PIPS process minimizes vendor's ability to protest.
- PIPS process allows smaller vendors to perform work.
- When core teams are visionaries, PIPS will run efficiently.
- Interview process minimizes client risk.

- Bid price and the actual cost of service might not be related.
- Technical specifications are used, but performance measurements are most critical.
- Transfer of risk is disruptive to vendors, due to them being reactive and depending on client MDC.
- Vendors require assistance to learn how to be proactive and minimize risk they do not control.

Neogard Stream (2 of 2)

In 2008-2009, PBSRG did follow up with FM-SH tests on numerous roofing structures. The permathane coating passed on roofs as old as 22 years and young as 13 years old. On the five roofs tested, three out of five did not leak, and the contractors fixed the roofs that did leak. Four out of five roofs had a customer satisfaction of 10, with the fifth roof rated a 9 out of 10. After a few years of running the Alpha program, it was modified to increase the high performance of contractors and efficiency of the system by adding in more requirements to be listed as an Alpha program contractor. Some of the requirements are five years' experience with 50 roof installations and 10 permathane installs, become licensed by Neogard, and maintain a 98% satisfaction rating with 98% of roofs not leaking. Contractors also must attend the best value annual education given at Arizona State University. The significance of Neogard is it was the first construction manufacturer who identified sponsoring the best value process would assist in identifying high performance clients. From 1997-2010 Neogard has installed successful roofs on the following PBSRG research clients: United Airlines, State of Hawaii, PECO Energy, Dallas Independent School District, L3 Facilities, US Coast Guard, US Army MEDCOM, Schering Plough, and Kansas Marine (Kashiwagi, et al., 2009c; Kashiwagi, et al., 2010b; PBSRG, 2014; Kashiwagi, 2014).

Best value PIPS testing confirmed the following (Kashiwagi, et al., 2009c; Kashiwagi, et al., 2010b; PBSRG, 2014; Kashiwagi, 2014):

- The best value PIPS is a sustainable practice for high performers.
- Transparency identifies high performance and reduces decision-making.
- The RMP and WRR is critical to the success of installation of roofs.
- The best value approach is more than a delivery method, but a way to decrease inefficiencies in any organization or industry.

Western States Contracting Alliance

From 2008-2010, the Western States Contracting Alliance (WSCA) has provided the States of Idaho, Alaska, and Oregon a total of $151M in procured services. The goal was to pilot and implement the best value PIPS. Vern Jones of Alaska and Mark Little of Idaho primarily introduced the WSCA to PBSRG. The WSCA is a contracting organization for states in the western region of the U.S., and has become a contracting/partnering arm for the best value approach (PBSRG, 2014).

State of Idaho Case Study (PBSRG, 2014):

- Ran two major tests in 2009: Student health insurance program (SHIP) [$33M], and Correctional Inmate Healthcare (CIH) [$67M].
- SHIP project: 3 year contract intended to minimize administration costs, and increase the customer satisfaction rating of the university and students.
    - The goal was to standardize coverage between all three university's [Boise, Idaho State, and Lewis Clark Universities].
    - The best value process was able to reduce premiums by 2%, spouse and dependent premiums by 19%, and increase overall benefits for everyone.
    - It was the first time the universities have seen a vendor measure and document performance.
    - Lessons learned: Student and spouse/dependents premium rates were stabilized for first time in 4 years.
- CIH project: 3 year contract to provide health services to inmates across Idaho (13 facilities).
    - Idaho Department of Corrections (IDOC) was displeased with incumbent who identified as best value.
    - ASU educated the vendor and client on the new environment change.
    - The vendor was able to reduce the MDC of the client.

State of Alaska Case Study (PBSRG, 2014):

- Ran one major test in 2010: Statewide Administrative Enterprise Resource Planning (ERP) system for $200M estimated total.
    - Contract was for 10 years to replace existing statewide administrative systems.
    - Automate financial, procurement, and human resource processes.
    - There has been no new data on progress of project.

State of Oregon Case Study (PBSRG, 2014):

- Ran one major test in 2010: Statewide facilities integrated software system for $1M.
    - Contract was for five years to develop, implement, and host facilities integrated software that can enable the state agency to achieve specific business mission objectives, and support operational needs.
    - Personnel needed extensive training.

Idaho Transportation Department (ITD) Case Study (PBSRG, 2014):

- ITD partnered with ASU in 2010, to run 6 major projects (half were IT software).
- Total awarded was $32M.
- One major project that completed was the Weigh-in-Motion Sensor System. It had the following results:
    - Vendor change order rate was 0%.
    - Vendor schedule delay was 0%.
    - Owner change order rate was 27.3% and schedule delay was 7%.

- Client satisfaction was 10.

Tests confirmed the following (PBSRG, 2014):

- Best value approach can identify high performers.
- Best value process is open, fair, and transparent.
- Best value can be implemented in service-type procurements.
- Best value identifies lowest price.
- Clarification phase is the most important.
- Interviews should be shortened to 25 minutes instead of 1 hour.
- Vendors are capable of measuring and documenting their performance.
- Education of IMT/PIPS is very important in service industries.
- Client's technical personnel may bring the greatest risk to delivery of the project.

Education Stream: Construction Class (1 of 2)

Due to the economy doing poorly, the research group was unsure how much business they would receive to sustain current operations. Dr. Dean Kashiwagi was buying out of faculty required courses, and decided to stop buying out teach a contracts class. Up until 2010, Dr. Dean has not taught a contracts class. The contracts class teaches students how to use and understand contracts in the construction industry. Students work with industry professionals to complete a semester long research project that helps them practice more proactive approaches to delivering a service. The class introduces the best value PIPS, but it is not the focal point of the class. The class uses each industry client's expertise to help students learn how to develop better business practices. The class utilizes the best value principles in all the projects, but the best value approach is primarily an underlay and taught as a proactive approach. The primary purpose of the class is to help students learn the proactive principles the best value approach has developed (Cioara, et al., 2014).

The class has aligned with PBSRG’s research, by staying informed with the latest insights, legal, and current problems plaguing the construction industry. PBSRG is able tie in student's resolutions of industry problems using the best value principles, and align it with the current research and marketing efforts. PBSRG has the advantage of interviewing professionals during final student presentations, gathering more information about the current methods used to solve problems in the construction industry (Cioara, et al., 2014).

Phase V of Best Value PIPS [2011-Present]: Education Paradigm

In this section, PBSRG identified the best value approach applies to all industries and academic areas. The approach in the academic areas [simplify, utilize expertise and apply concepts to improve performance] can help change academic education/research and the industry paradigm at the same time. PBSRG discovered the academic model is important to developing a sustainable pipeline, through university students who can learn and continue to implement the research in industry. (PBSRG, 2014):

- 43 clients
- $4M of services
- Major Case Studies and Streams
    - Malaysia
    - State of Minnesota Stream
    - Netherlands Stream
    - Canada
    - Education Stream
    - Saudi Arabian/Indian Effort

Phase V of the best value approach identified the following (Kashiwagi, 2014):

- Countries that do not have visionaries will have difficulty implementing the best value approach.
- Transparency increase accountability and causes bureaucratic countries and industries to resist the best value approach.
- State of Minnesota and country of the Netherlands proves the best value approach is a sustainable approach.
- Country of Canada proves the best value approach can be successfully implemented in more than one country.
- PIPS/PIRMS is unique and cannot be found anywhere else in the world except Arizona State University.
- Construction non-performance persists, due to the difficulty in paradigm from releasing control to utilizing the expertise of others.
- The honors program is the likely research pipeline that may assist industry in understanding the importance of the Information Measurement Theory.

Malaysia

PBSRG has been active in trying to bring the best value technology to Malaysia since 1996. In 2006, 2007, and 2009, PBSRG presented the technology to the Malaysian academic community and construction industry, through keynote addresses and paper presentations. The Malaysian construction industry has experienced a standstill with the Malaysian academia, due to a major research effort by the Construction Research Institute of Malaysia (CREAM) and the Construction Industry Development Board (CIDB) from 2001-2009, to increase research and development (R&D) for construction in Malaysia. During the eight years of research and development by CREAM and CIDB, the research effort has not produced any implementable construction research. The research effort totaled $18.9M to fund, incorporating 39 individual research efforts (Kashiwagi, and Kashiwagi, 2011; Kashiwagi, et al., 2013a).

During the six years of meeting with Malaysia, PBSRG met interest from two universities [UITM in Kuala Lumpur and USM in Penang] and one industry partner [Brunsfield].

Both universities have been unsuccessful in implementing the best value technology, due to a slow rate of Malaysian professors and research efforts fully adapting and committing to learn and understand the best value technology. Brunsfield, the largest contractor developer in Malaysia, has had more success with the technology, and has implemented the best value technology into their entire supply chain. They identified every entity in their supply chain to be exposed to best value technology. Dato Gan, Brunsfield President, and four of his executives decided to attend the 2010 best value conference for reeducation. Later in the year of 2010, Brunsfield signed a three-year contract with ASU/PBSRG to implement the best value PIPS model in their entire supply chain. The major goal of Brunsfield was to build research capability and become a primary research organization, and then support a university of their choice to participate as a research partner (Kashiwagi, and Kashiwagi, 2011; Kashiwagi, et al., 2013a).

State of Minnesota Stream: University of Minnesota; Hennepin County; Rochester School District; City of Rochester (3 of 3)

University of Minnesota Case Study Results (Smithwick, & Kashiwagi, 2012, PBSRG, 2014; Kashiwagi, 2014):

- Used the best value PIPS for 6 years [2005-2009, 2011-2012].
- Total number of projects was 349 [about 180 were best value projects].
- Total award cost was over $97M.
- Percentage of awards to best value contractors was 56%.
- Average contractor change order rate was 0%.
- Average contractor delay rate was 3%.
- Average customer satisfaction was 9.5 (1-10).
- Saved $42M (31%) on construction project costs.

Hennepin County Case Study Results (Smithwick, & Kashiwagi, 2012, PBSRG, 2014; Kashiwagi, 2014):

- Total number of projects was 10.
- Total award cost was over $37.4M.
- Percentage of awards to best value contractors was over 50%
- Average contractor change order rate was 0.1%.
- Average contractor cost increase was 0%.
- Average client delay rate 6.3%.

Rochester School District Case Study Results (Smithwick, & Kashiwagi, 2012, PBSRG, 2014; Kashiwagi, 2014):

- Total number of projects was 43.
- Total award cost was over $29.5M.
- Percentage of awards to best value contractors was 65%.
- Average contractor change order rate was 0%.
- Average contractor cost increase was -.1%.

- Average client delay rate 2.6%.
- Average client cost increase rate 6.1%.
- Customer satisfaction was 9.89 (1-10).
- Client rating was 9.97 (1-10).

City of Rochester Case Study Results (Smithwick, & Kashiwagi, 2012, PBSRG, 2014; Kashiwagi, 2014):

- Total number of projects was 11.
- Total award cost was over $4.9M.
- Percentage of awards to best value contractors was 50%.
- Average contractor change order rate was 0.1%.
- Average contractor cost increase was 0%.
- Average client delay rate 2.1%.
- Average client cost increase rate .3%.
- Customer satisfaction was 10 (1-10).
- Client rating was 9.7 (1-10).

Netherlands Stream (4 of 4)

From 2006 to 2013 the best value approach has been applied over 200 times, with a budget spend of over 2 B €. 26.8% (56 projects) in the private sector and 73.2% in the public sector (153 projects) (Rijt & Witteveen, 2013; PBSRG, 2014). Within the public sector projects have been executed at several organizational levels (Rijt & Witteveen, 2013; PBSRG, 2014):

- 8 projects at 4 different provinces.
- 27 projects in 17 different municipalities (7 of the 10 biggest municipalities have applied the best value approach).
- 29 projects at 14 different water boards (out of 25 water boards in Netherlands).
- In total an estimated 107 projects in the construction industry, 31 projects in ICT, 5 catering projects, 3 security projects, 16 commodities, and 9 in health sector have been completed.

In the private sector the following parties have put the largest number of projects on the market with the best value approach: Heijmans (12 projects); Boehringer Ingelheim (7 projects); Ballast Nedam (7 projects); ERA contour (6 projects) and IHC Merwede (6 projects) (all calculations above by the authors based on http://bit.ly/1jDTAAt). The best value approach has had tremendous success in the Netherlands, and is the only system to bring real change in their construction industry (Rijt & Witteveen, 2013; PBSRG, 2014).

Canada

In 2007, PBSRG had its first contact with the country of Canada, through a facilities management conference presentation. PBSRG was unable to prototype test the best value process at that time. A few years later in 2010, University of Alberta (sister university of Arizona State University), was collaborating with ASU to share best business practices in numerous areas. Ray Jensen, Associate Vice President for University Business Services, mentioned the University of Alberta should consider speaking with PBSRG about its non-traditional research approach, due to the success of its procurement model that was tested on numerous projects at Arizona State University. The University of Alberta became the first research client from Canada, making Canada PBSRG's second major success to implement the best value process outside the United States. PBSRG began prototype testing the best value process from coast to coast in Canada, and implementing it through 8 of 25 of Canada's top 25 universities (PBSRG, 2014). Canada case study results (PBSRG, 2014):

- Total number of clients is over 10.
- Total number of projects is over 34.
- Total services procured over $26M.
- Contract budgets reduced up to 38%.
- Out of 14 universities, client satisfaction rating of best value vendor performance is 74%.
    - Satisfaction rating of best value procurement process is 76%.
    - Satisfaction rating of performance of their organization using best value is 67%.
    - Evaluation of proposals was reduced by 50% from over five days to less than five days.

University of Alberta Case Study Results (PBSRG, 2014):

- Total best value projects was 11.
- Estimated Value of best value projects was over $200M.
- Internal estimate of project savings was $8-15M.
- % of projects where best value was the lowest cost was 64%.
- Average client satisfaction with vendor performance was 9.8 (out of 10).
- Vendor/contractor change order rate was 1.2%.
- Vendor/contractor schedule delay rate was 3.7%.

University of Dalhousie Case Study Results (PBSRG, 2014):

- # of change orders was reduced from 4 to 0.
- Cost impacts what reduced from 11% to -5%.
- Schedule impacts were reduced from 3.6 weeks delay to 3 weeks early.
- Client satisfaction rating was increased from 4.1 to 10 (out of 10).

Education Stream: Deductive Logic Class and Barrett Summer Scholars (2 of 2)

First introduced in 2009 by Dr. Jacob Kashiwagi, the objective of the course was to teach the Information Measurement Theory, developed as the structural logic of PIPS. The course is taught to university honors students to help them first understand people and their capability, learn how to simplify information, see the big picture, learn who they are, and better understand natural laws to align themselves to opportunities upon graduation. PBSRG and the Del E Webb School of Construction partnered with Barrett, The Honors College, to capture the smartest top 5% of ASU students in 2011. The purpose was to develop a pipeline for research, by identifying visionary students to work for PBSRG and proliferate the research effort. Additionally, PBSRG would document case studies of students who have changed their life, due to applying IMT to their life, and use to support the best value model for paradigm change in industry. By teaching industry IMT, PBSRG claims it will teach people how to think more simply, and come to conclusions faster. The results of the Deductive Logic Class are the following (Rivera, 2013; PBSRG, 2014):

- Total # of students taught: 740.
- Total # of classes per semester: 5.
- Total # of students recruited to support PBSRG: 28.
- Total number of different degrees taught: 74.
- Total class rating: 4.73 (out of 5).
- Engineering sample survey of 35 students: 9.4 (out of 10).
- Total number of students who documented impact: 98.

Deductive Logic Class Case Study Results (Rivera, 2013; PBSRG, 2014):

- Student A learned how to become more transparent.
- Student B overcame depression and stopped the use of depression drugs in one semester.
- Student C was able to cope with the sudden loss of his fried due to suicide.
- Student D was able to overcome alcoholism and has been sober for over a year.
- Student E overcame anger, depression and drug and alcohol abuse, and has since earned many collegiate achievements and has been accepted into a prestigious law school.
- Student F overcame suicidal tendencies and was eventually removed from the watch list.

In 2013, PBSRG was exposed to Barrett Summer Scholars, an Arizona State University summer program for 7-9th grade students across Arizona, through Jake Gunnoe, Graduate Research Assistant at PBSRG. The program's objective is to expose forward thinking 7-9th graders to the Barrett Honors program at Arizona State University. The program has the following characteristics:

- 1-2 week long.
- 14-20 students per class.
- Students select their subject matters.
- Classes are classified as required and electives.

PBSRG Graduate students [Jake Gunnoe and Alfredo Rivera] taught the Deductive Logic (DL) class as an elective. The DL class has been taught for two years [2013-2014]. In

2013, the first class taught fourteen seventh grade students. The objective was to identify if children loved the material, and help Jake and Alfredo learn how to teach simply. The results of 2013 were: satisfaction was 100%, class return rate was 81% (Rivera, 2013). In 2014, Jake and Alfredo returned to teach three classes, totaling 53 students. Summer 2014 had the following characteristics (PBSRG, 2014):

- Taught one eighth grade class and two seventh grade classes.
- Objective was to identify if the first year and honors program results can be replicated (PBSRG, 2014):
    - Identify if course can reduce stress.
    - Identify course's value in comparison to other courses.
    - Identify value of course and instructors.

The results of the 2014 Barrett Summer Scholars (BSS) were the following (PBSRG, 2014):

- 4 in overall rating for eighth grade.
- #1 rated for seventh graders.
- Course satisfaction rating was 9.39 (out of 10).
- Instructor course rating was 9.77 (out of 10).
- Stress was reduced by 14%.
- The DL class had graduate instructors, while seasoned professionals ran the other classes. For two graduate students to reflect such scores is outstanding.
- The BSS coordinator publicized future PBSRG events.
- ASU West Dean was interested in the honors class curriculum.
- ASU West Barrett Dean was encouraging students to attend the fall 2014 conference.

The goal of using K-12 education is to expose PBSRG research to more parents and professionals through the BSS program and PBSRG sponsored student organization events, which will expand the professional network. It is important for the sustainability of the non-traditional research approach to provide graduate students to continue to improve their teaching skills, and generate awareness to industry of the impact the research group is having on K-12 education.

Saudi Arabian/Indian Effort

The construction industry is an integral part of the Indian and Saudi Arabian’s economy. India has a vision for 2025 to emerge as a major economic power, which will require rapid growth in their infrastructure. PBSRG has identified a former master’s student, Syed Nihas, in the DEWSC that identified India has similar problems as the U.S. in its construction industry. The MS student from India was first exposed to the non-traditional research approach through the Deductive Logic course and Advanced Procurement courses, and figured out the non-traditional approach was the only method that could help India achieve its goal. Syed has a relative [father] who is well connected with the Indian construction and education centers in India. Syed brought PBSRG over to India to establish a partnership with visionaries to run tests, and run education programs out of top construction universities at the end of 2013. Dr. Dean and Syed Nihas set out to India in September 2013 to four major cities to present to universities and industry. After the trip, the leading engineering school SJCE, was identified to partner with PBSRG and create a Deductive Logic online and in class course in the fall of 2014. SJCE purchased a license from ASU PBSRG. Shortly after Syed Nihas' graduation and return to India at the end of 2013, the Indian effort was pushed to launch in January 2015. PBSRG identified an Indian PhD student, Dhaval Gajjar, to support the effort. Dhaval picked up where Syed left off, and began working with SJCE. PBSRG developed the online course using its education platform Best Value Academy, and made the material easily accessible to the country of India. The web platform is equipped with the undergraduate course Information Measurement Theory, and the graduate course Advanced Procurement Systems. The course is updated continually with new material that is fed from five ASU PBSRG classes (Nihas et al., 2013; PBSRG, 2014).

In Saudi Arabia, the construction industry is broken like much of the world. Due to the wealth of the country, many Saudi Arabian foreign graduate students attend the Del E Webb School of Construction at Arizona State University for answers. The students are exposed to the best value approach and become interested in working closer with PBSRG. PBSRG has identified a Saudi Arabian PhD student in 2013, Yasir Alhammadi, to create a worldwide database that identifies models that are similar to the non-traditional research model and measure the current performance of the performance industry. Since 2013, five other Saudi Arabian students have joined the worldwide database. Each semester, more Saudi Arabian graduate students attend the DEWSC. The goal is to develop a pipeline of Saudi Arabian and Indian students, who are fully funded visionary graduate students, to conduct research on the non-traditional research approach for their graduate or post-graduate degrees. PBSRG educates the students in the best value approach during the Fall and Spring semesters. The Saudi students return to Saudi Arabia each summer. The students attempt to identify visionaries in major university institutions and industry. Students have found major resistance in these areas, due to the bureaucratic structure of the country. PBSRG is looking to identify major universities that will partner with ASU PBSRG to educate them in the best value approach. Also, identify major industry partners to run best value tests on projects. Ultimately, to achieve this goal, PBSRG feels a pipeline of 20- 30 fully funded graduate/post-graduate students should continue to receive education at ASU PBSRG and return to Saudi Arabia as best value experts (PBSRG, 2014).

APPENDIX F

VERY IMPORTANT PEOPLE

Over the twenty years of operation, the Performance Based Studies Research Group (PBSRG) has had numerous visionary research partnerships that helped proliferate and develop the best value approach to its current mature state (PBSRG & Kashiwagi, 2014):

The following are responsible in part to the evolution of the best value approach:

Year 1996

- Mike Steele: Neogard (Smithwick, 2009; PBSRG, 2014; Kashiwagi, 2014):
  - In 1996, Tom Tisthammer, sprayed polyurethane foam (SPF) roofing expert and applicator of Neogard's high performance Permathane SPF roof, introduced him, President of Neogard, to Dr. Dean Kashiwagi, Director of PBSRG.
  - Neogard is a SPF roofing manufacturer.
  - Mike Steele was plagued with an industry that manufacturers and contractors sold products to clients based on warranties that did not protect or minimize the client's risk.
  - Neogard could not figure out how to protect themselves against low performing contractors.
  - When Mike Steele and Dr. Dean met, Dr. Dean proposed Neogard adopting the performance based concepts PBSRG developed.
  - PBSRG was asked to develop a delivery system that would create a win-win for Neogard by partnering high performance contractors and visionary clients.
  - Neogard is now a high performance manufacturer, due to the best value approach, and is currently the longest running research partnership to PBSRG.

Year 1997

- John Savicky – Arizona State University (PBSRG, 2014; Kashiwagi, 2014):
  - Was vital with PBSRG’s prototype testing on large and new construction projects beginning in 1999.
  - He became key part of PBSRG’s education and research development.
  - He currently is the Director of Sourcing Research for PBSRG.

Year 1998

- Ron Campbell – United Airlines (PBSRG, 2014; Kashiwagi, 2014):
  - The visionary that led UAL to deliver the most successful construction projects to date at the San Francisco UAL Maintenance site.
  - Stated the PIPS process performed in less time with less money and deliver high quality, then it would have using the low-bid system.
  - Campbell re-roofed almost every roof on the UAL Maintenance Site in San Francisco.

    - None of the roofs currently leak.

- Gordon Matsuoka, Stephen Miwa, and Charley Serikawa – State of Hawaii (Kashiwagi, 2002a-c; Kashiwagi, 2003a-c; PBSRG, 2014; Kashiwagi, 2014):
    - Gordon Matsuoka & Stephen Miwa - State of Hawaii (DAGS)
        - Brought PIPS to Hawaii DAGS in 1997.
        - Their vision was to streamline delivery of construction, minimize management overhead, optimize delivery process, and remove inefficiencies of low-bid awards by going to PIPS.
        - Partnered with Architect Gaylyn Nakatsuka and PM Chris Kinimaka to assist in minimization of management work, decision-making and risk.
        - Their efforts resulted in an important discovery "best value construction has the same or lower first costs as the low-bid environment." [First time to be identified so clearly]

    - Charley Serikawa - University of Hawaii Project Manager
        - Lead PIPS through over 35 projects.
        - Identified PIPS was the most impressive procurement process in all his years.
        - Was pivotal in the proliferation of PIPS in the University of Hawaii.
        - Served as PM of a performance oriented general contractor for many years.
        - He wanted to minimize management, decision-making, and control of the UH engineering and construction management staff.
        - When the UH decided to discontinue PIPS and his efforts to continue its implementation, he decided to retire and work as a consultant.

Year 2000

- Richard Byfield – State of Utah (Kashiwagi, 2002a-c; Kashiwagi and Byfield, 2002a-d; PBSRG & Kashiwagi, 2014):
    - Personally responsible for bringing PIPS to deliver large construction projects.
    - Though the State of Utah could not sustain the PIPS effort, Byfield’s participation led to successful efforts in State of Hawaii, Dallas Independent School District, Denver Hospital, FAA, U.S. Coast Guard, and Harvard University.
    - His efforts led to the following:
        - PIPS can work on large complex general construction projects.
        - 4 out of 5 projects were completed on time and within budget [Projects were under budget by $5M].

        - State of Utah received higher level of quality [PIPS received rating of 9 over the low-bid system which received a 4].
        - PIPS was shown to work with modifications.

Year 2003

- Sylvia Romero – Arizona State University (Kashiwagi, et al., 2008b; PBSRG, 2014):
    - First full time marketing/coordination specialist.
    - Became a key part of PBSRGs strategic plan to expand its reach worldwide and expose more people to the best value approach.

Year 2004

- Patrick Okamura – International Facilities Management Association (IFMA) (PBSRG, 2014):
    - Became a major partner with PBSRG and Del E Webb School of Construction (DEWSC), to begin groundwork for the Facilities Management graduate program.
    - Facilities Management master's degree program eventually was created and launched by PBSRG in 2006, and is the platform for best value education in the DEWSC at Arizona State University.

Year 2005

- Mike Perkins - University of Minnesota (PBSRG; 2014):
    - Associate Vice President of CPPM, Retired
    - The visionary that attended the 2004 Best Value Conference and became the early adopter of the best value PIPS in the State of Minnesota.
    - The forerunner to establishing PIPS as a state law.
    - Brought PIPS to the forefront of delivering services in the State of Minnesota

- Dr. Kenneth Sullivan - Arizona State University (Kashiwagi, et al., 2008b; PBSRG, 2014):
    - Became an official part of PBSRG.
    - Became the second full time assistant professor in PBSRG.
    - Became a critical piece in the implementation of PBSRGs strategic plan to extend the reach and exposure of the best value approach for future sustainability, with the major success of Canadian best value implementation coast to coast.
    - Was the key person that partnered with IFMA and DEWSC to create PBSRGs first master's degree program [facilities management emphasis].
    - FM program became the foundation of best value education until 2011.

    - He is now the Co-Director of PBSRG.

- Debbie Brown - Project Management Institute (Sullivan & Brown, 2007; PBSRG, 2014):
    - The visionary member who partnered with PBSRG to run a small IT project.
    - IT project was a software project.
    - This was the first non-construction best value implementation in PBSRG history.
    - The software project was a failure, but was not viewed as a failure by PBSRG, due to the client not fully using the best value approach.
    - Became a critical partner and eventually linked the Project Management Institute (PMI) with PBSRG in 2006.

Year 2006

- Jacob Kashiwagi – Arizona State University (PBSRG, 2014):
    - Became an official part of PBSRG.
    - Became a critical piece in the implementation of PBSRGs strategic plan.
    - Became the key person who created and developed the Deductive Logic course, which became part of the honors program in 2011.
    - Due to political reasons at the DEWSC, he was not able to conduct his PhD at Arizona State University.
    - He eventually received an opportunity with Sicco Santema at the Delft University in the Netherlands to study supply chain management.
    - He received his PhD in Supply Chain Management in 2013.
    - He is now a second major full time program manager for PBSRG.

Year 2007

- Ray Jensen - Arizona State University (Michael, 2008; Kashiwagi, 2012; PBSRG & Kashiwagi, 2014):
    - Associate Vice President for University Business Services
    - Introduced to PIPS in 1996.
    - Due to an immature PIPS structure and common practiced principles by ASU, Ray decided not to partner with PBSRG.
    - 10 years later, in 2006, Dr. Dean presented the improved PIPS to Ray Jensen and John Riley, Executive Director of Purchasing and Business Services, and ASU began testing immediately.
    - PBSRG conducted three major projects.
    - Ray identified the updated PIPS from the old version 10 years previous as:
        - Better mechanism for selecting vendors.
        - Reduces need for detailed scopes of work.
        - Transfers risk and decision-making to contractor.

        - Provide efficient approach to contract management.
        - Desired to integrate the best value approach within the ASU procurement processes.

Year 2008

- Netherlands (Kashiwagi & Kashiwagi, 2011; Santema, 2011; Rijt & Witteveen, 2011; Kashiwagi, et al., 2012a; Kashiwagi, Kashiwagi, et al., 2012b; Kashiwagi & Kashiwagi, 2013):
    - George Ang - Ministry of Housing, Netherlands
        - He was exposed to the best value approach at a conference in France.
        - He identified PBSRG and the best value approach to help alleviate the collusion problem within the entire Dutch construction industry.
        - Brought PBSRG to the Netherlands and introduced Dr. Dean to many private and government representatives.

    - Jeroen van de Rijt - Scenter Management Consultants
        - Became a critical piece to PBSRG, by agreeing to translate the best value concepts of IMT, KSM, Industry Structure and PIPS into Dutch.
        - This helped with making the best value concepts more relatable to the Dutch in order to take ownership of the paradigm.
        - He helped proliferate presentations for PBSRG to the Dutch industries.
        - He helped with identifying visionaries to conduct best value testing.

    - Sicco C. Santema - Delft University of Technology
        - Heijmans, third largest Dutch contractor, identified Sicco as the visionary academic to proliferate the best value approach.
        - He was critical in identifying immediately that the best value approach was the most accurate explanation and solution to the Dutch construction supply chain problems.
        - He was also pivotal in the acceptance and graduation of one of PBSRGs experts, Jacob Kashiwagi.

Year 2009

- John Morrison – State of Oklahoma (Kashiwagi, 2012; PBSRG, 2014; Kashiwagi, 2014):
    - State Architect.

    - Exposed to best value approach in 2009 at a National Institute of Governmental Purchasing (NIGP) meeting.
    - Identified two other visionaries, Steve Hagar and Scott Schlotthauer, from Central Purchasing to proliferate the implementation of the best value approach.

Year 2010

- Nathan Chung – MEDCOM (Sullivan, 2005; Chong, 2007; Sullivan, 2009; Kashiwagi, et al., 2009b, PBSRG, 2014):
    - Chief, Facility Life Cycle Management Division.
    - The visionary who contacted PBSRG to help MEDCOM overcome MDC within their organization.
    - Was a major contributor to the overall success of the best value implementation at MEDCOM.

APPENDIX G

MAJOR RESISTANCES

Due to the transparency of the new research approach, the Performance Based Studies Research Group (PBSRG) has had numerous resistances. The new research approach is a Disruptive System due to the following (PBSRG, 2014; Kashiwagi, 2014):

- The BV approach is a disruptive solution because it has no ties to the traditional management approach.
- It identifies the traditional model as inefficient and ineffective.
- It forces academics to change [develop a higher rate of processing].
- Requires understanding of natural laws, courage, and accountability.
- Requires real vision of the future and not memorizing technical details.
- All best value results show performance, and replace academic peer reviews in the proliferation of best value tests.
- It requires transparency and illuminates low performing academics and industry professionals, who have developed recognition through relationships within academic circles that have very little industry expertise.

The following are resistances of PBSRG:

Year 1994

- Vendors would not use the PIPS for continuous improvement, because the model would tell them where to improve next. The vendors did not understand the model was designed for such reasons (PBSRG, 2014; Kashiwagi, 2014).

- Two years after working as a visiting professor, the Del E Webb School of Construction (DEWSC) faulty personnel recommended that Dean Kashiwagi not be hired as a tenure track professor (PBSRG, 2014; Kashiwagi, 2014):
    - That decision was overridden by the Dean of the College of Engineering.

- Larry Greenfield, Tremco's President, lost a contract to Steve Miley Construction and Custom Seal (PBSRG, 2014; Kashiwagi, 2014).
    - Tremco is the largest roofing manufacturing company in the U.S.
    - PBSRG was collecting roofing data on Motorola roofing contract, when Tremco lost the contract.
    - Larry was so upset, he wrote a formal letter to the President of Arizona State, Lattie Coor, and Dean of the College of Engineering, Dean Chang, to shut down PBSRG.
    - Larry did not understand the best value approach, and eventually came back to PBSRG in 2005, and is currently a research client.

Year 1995

- Due to political resistance amongst academic faculty at the Del E Webb School of Construction, Director Badger, was forced to move Dean Kashiwagi and the

PBSRG research effort to another building to ease the tension with the rest of the faculty (Kashiwagi, et al., 2008b; PBSRG, 2014; Kashiwagi, 2014).
    - PBSRG research was beginning to take off faster than any other DEWSC effort.
    - The teaching faculty doing research did not appreciate or understand how PBSRG was becoming so successful.

Year 1996

- The faculty personnel committee at the Del E Webb School of Construction recommended that Dean Kashiwagi not be promoted (PBSRG, 2014; Kashiwagi, 2014).
    - This was overridden by the DEWSC Director and Dean of the College of Engineering.

Year 2001

- State of Utah (Kashiwagi, et al., 2002a-c; Kashiwagi, and Byfield, 2002a-d; PBSRG, 2014; Kashiwagi, 2014):
    - Delivered five successful construction projects ($80M).
    - It was identified that the contractors and designers desired to move back to the relationships and price based procurements.
    - After the delivery of the University of Utah Olympic Housing for the 2002 Olympic Winter games, the state discontinued the use of the Performance Based Procurement System (PBPS) [name of PIPS before its change in 2000].

Year 2002

- State of Hawaii (Kashiwagi, and Byfield, 2002a-d; Kashiwagi, et al., 2003a-c; Savicky, 2007; Kashiwagi, 2014):
    - Due to political resistance, the State of Hawaii and Hawaii Department of Transportation ceased from using the PIPS after five years of successful implementation.
    - State of Hawaii was the only legal protest that went to court in early 2002, and led to the only legislative document publishing the performance of the Performance Information Procurement System (PIPS) delivery system in 2000.
        - The petitioner alleged the use of PIPS's competitive sealed proposals, replacing the competitive sealed bids, was not allowed under the Hawaii Public Procurement Code.
        - PBSRG overcame the protest in court, and the state pronounced the PIPS system as legal.

        - Due to numerous parties within the state being uncomfortable, accusations of the PIPS system was of high costs and technical incompetence.
    - DAGS conducted an internal report on the PIPS system that hypothesized it was less costly and provided higher performance for procuring the retrofitting of roofing systems.
        - DAGS Audit was on the PIPS design-build cost versus the traditional design-bid-build [low-bid] construction deliveries.
        - The results identified the following:
            - PIPS cost was 2.5% versus traditional cost of 11%.
            - PIPS project management cost was .40% versus traditional cost of 1.90%.
            - PIPS construction cost was -5.6% versus traditional cost of -2.30%.
            - PIPS cost of quality was -2.7% versus traditional cost of 11.1%.
            - Overall, the DAGS audit identified PIPS as saving the State of Hawaii 13.8% versus the traditional low-bid system.
    - In 2002, despite the overruling of the protests, and Charlie Serikawa ready to award 17 UH painting projects, with a 67% cost savings using PIPS over the traditional low bid system, the decision to terminate PIPS was made.
    - The University of Hawaii chose to return to the low-bid environment, and in 2005 tried to develop a performance based process with no success.
    - Due to frustration with the system, Charlie Serikawa retired and became a private consultant.

- Federal Aviation Association (Kashiwagi, and Mayo, 2001a-b; Kashiwagi, et al., 2004a; Kashiwagi, 2014):
    - Spent approximately $500k over three years of testing PIPS, but their bureaucracy never allowed the process to run as designed.
    - The FAA finally gave up without running a complete test.

Year 2003

- National Science Foundation (NSF) (PBSRG,2014; Kashiwagi, 2014; Kashiwagi, et al., 2008b):
    - The non-traditional research approach proposed a new project management model to the NSF as a grant proposal.
    - The NSF identified the research as poorly constructed and not relevant, and did not give PBSRG a grant.
    - When learning of the NSF, Harvard University funded an entire project consisting of six midsize construction tests that delivered at lower costs,

    - higher performance, minimization of project management functions, compared to existing Harvard construction management results.
    - The Harvard test resulted in Harvard University winning the 2005 Corenet Global Innovation of the Year Award.

Year 2004

- Connecticut State University (PBSRG, 2014; Kashiwagi, 2014):
    - PBSRG attempted to transfer the PIPS research program to the Central Connecticut State University.
    - The research test and research program could not be sustained.

- Glasgow Caledonian University Built Environment Group (PBSRG, 2014; Kashiwagi, 2014):
    - Scotland based group.
    - Awarded Dr. Dean Kashiwagi a visiting professorship from 2004-2008.
    - Dr. Dean Kashiwagi attempted to transfer PBSRG research to Scotland and it became unsustainable and failed.

Year 2005

- Florida International University (PBSRG, 2014; Kashiwagi, 2014):
    - PBSRG attempted to transfer the PIPS research program to the Florida International University.
    - The research test and research program could not be sustained and failed.

Year 2007

- Associated Schools of Construction (PBSRG, 2014; Kashiwagi, 2014):
    - Peer review group disapproved of a paper that identified the updated PIPS testing results and research methodology.
    - The committee identified that PBSRGs claims must be audited and the concepts were not validated.
    - Due to the committee not having any research results or performance information to challenge the PBSRG results, the paper was accepted and presented in the 2008 Cobra conference.

Year 2010

- Arizona State University (Michael, 2008; Kashiwagi, 2012; Kashiwagi, 2014):
    - Contract: Help Desk Project.
    - Problem: Perceived irregularities in the best value process, which caused a protest from one of the vendors.

- Outcome: Procurement Director denied protest, protestor overruled denial, and then an Arbitrator overruled the protest.
- PBSRG was found to be in accordance with all state procurement laws.

- State of Oklahoma (Kashiwagi, 2012; PBSRG, 2014; Kashiwagi, 2014):
  - Contract: OJA project.
  - Problem: A relationship between agency head and party connected to lobby group connected to prioritized best value, and caused a protest by a non-selected vendor.
  - Outcome: Protest was dismissed.

Year 2013

- Democratic Republic of Congo (PBSRG, 2014; Kashiwagi, 2014):
  - Dr. Dean presented at an international conference in Paris in 2012, and the visionary Emmanuel Moteng, PhD student, was exposed to the Best Value Approach and identified the best value approach as the way to help his country, Democratic Republic of Congo, to deliver a $16B, 20-year hydroelectric dam in the Inga River.
  - DRC approached PBSRG to select the winning vendor/alternative and to implement the best value system to administer the contract to minimize the risk of project deviations.
  - In April 2014, Drs. Dean and Jacob, return to Paris France, this time to present to the DRC's Minister of Hydroelectricity, Financial Consultants [World Bank, Orrick], and Republic of South Africa [major purchaser of energy on Inga dam].
  - Project: build a series of hydroelectric power plants on the Inga site located on the Congo River, where 42K MW of clean renewable energy can be generated.
    - There would be six interlinked phases, each taking 5-7 years to develop.
  - Problem: Project was to start by end of 2015, during the time of DRC presidential elections.
    - DRC currently has a corrupt government and election time is a sensitive time.
    - There was political stress of the 2016.
    - The World Bank and Orrick did not want PBSRG to become involved, due to the increase in transparency the best value system brings.
    - Orrick would not sign the License agreement with ASU PBSRG due to a disagreement of the indemnification clause [This was just a litigation move to keep ASU PBSRG from participating in the project].

- Due to Dr. Dean being an employee of ASU, should work be completed by PBSRG and Orrick is dissatisfied with PBSRG work, ASU would be liable to absorb any costs [due to ASU signing the contract and not Dr. Dean].
- Although PBSRG mitigated that risk, by taking on all the risk, the contract was hung up between the DRC and ASU.

APPENDIX H

PUBLICATIONS

The Performance Based Studies Research Group (PBSRG) has the following publications (PBSRG, 2014; Kashiwagi, 2014):

- Refereed Journal Publications (90)
- Non-Refereed Conference Publications (17)
- Refereed Conference Publications (194)
- Books Published (29)
- Book Chapters (9)
- Technical Reports (14)

Refereed Journal Publications (90):

1. Nihas, S., Barlish, K., Kashiwagi, J., and Kashiwagi, D. (2013). “An Analysis of Construction Industry Structure in India.” Journal for the Advancement of Performance Information and Value, Vol. 5 (2), pp. 166-179.
2. Nihas, S., Barlish, K., Kashiwagi, J., and Kashiwagi, D. (2013). “The Impact of Culture on the Indian Construction Industry.” Journal for the Advancement of Performance Information and Value, Vol. 5 (2), pp. 153-165.
3. Nihas, S., Barlish, K., Kashiwagi, J., and Kashiwagi, D. (2013). “The Introduction of the Best Value Approach in India.” Journal for the Advancement of Performance Information and Value, Vol. 5 (2), pp. 137-152.
4. Gajjar, D., Sullivan, K., and Kashiwagi, D. (2013). “Post Construction Quality Evaluation – A Manufacturer’s Use of the End User to Minimize Risk.” Journal for the Advancement of Performance Information and Value, Vol. 5 (1), pp. 20-26.
5. Smithwick, J., Sullivan, K., and Kashiwagi, D. (2013). “Utilization of a Best Value Structure on a City’s Park Renewal and Upgrade Program.” Journal for the Advancement of Performance Information and Value, Vol. 5 (1), pp. 50-58.
6. Gajjar, D., Kashiwagi, D., Sullivan, K., and Kashiwagi, J. (2013). “Post Occupancy Performance Evaluation of Time of Installation Factors - A Seven Year Study of SPF Roofing. ASCE Journal of Performance of Constructed Facilities. Accepted July 22, 2013. doi:10.1061/(ASCE)CF.1943-5509.0000500
7. Lines, B., Sullivan, K., Hurtado, K., and Savicky, J. (2013). “Planning in Construction: Longitudinal Study of Pre-Contract Planning Model Demonstrates Reduction in Project Cost and Schedule Growth.” International Journal of Construction Education and Research Accepted on December 3, 2013
8. Perrenoud, A., Lines, B. and Sullivan, K.(2013). "Measuring Risk Management Performance within a Capital Program". Journal of Facilities Management, Accepted by the Journal of Facilities Management, and scheduled for Publication in their Volume 12 Issue 2.
9. Gajjar, D., Kashiwagi, D., Sullivan, K., and Kashiwagi, J. (2013). “Post Occupancy Performance Evaluation of Time of Installation Factors - A Seven Year Study of SPF Roofing. ASCE Journal of Performance of Constructed Facilities. Accepted July 22, 2013. doi:10.1061/(ASCE)CF.1943-5509.0000500

10. Smithwick, J., Shultz, T., Sullivan, K., and Kashiwagi, D. (2013) “A model for the Creation of Shared Assumptions and Effective Preplanning.” International Journal of Facility Management, Vol. 4 (3), pp.16-27
11. Lines, B., Stone, B., and Sullivan, K. (2013). “Organizational Implementation of Best Value Project Delivery: Impact of Value-Based Procurement, Preplanning, and Risk Management.” CIB Journal for the Advancement of Performance Information and Value, Vol. 5 (1), pp. 1-19.
12. Gajjar, D., Sullivan, K., and Kashiwagi, D. (2013). “Post Construction Quality Evaluation-Manufacturer's Use of End User to Minimize Risk.” CIB Journal for the Advancement of Performance Information and Value, Vol. 5 (1), pp. 20-26.
13. Lines, B., Sullivan, K., and Perrenoud, A. (2013). “Optimizing Cost and Schedule Performance through Best Value Project Delivery: Application within a Design-Build Project.” CIB Journal for the Advancement of Performance Information and Value, Vol. 5 (1), pp. 27-40.
14. Perrenoud, A., Sullivan, K. (2013). “Implementing Project Schedule Metrics to Identify the Impact of Delays Correlated with Contractors.” CIB Journal for the Advancement of Performance Information and Value, Vol. 5 (1), pp. 41-49.
15. Smithwick, J., Sullivan, K., Kashiwagi, D. (2013). “Utilization of a Best Value Structure on a City’s Park Renewal and Upgrade Program.” CIB Journal for the Advancement of Performance Information and Value, Vol. 5 (1), pp. 50-58.
16. Sullivan, K. (2013). Best Value Business Model. University of British Columbia. April 22, 2013. Vancouver, British Columbia, Canada.
17. Sullivan, K. (2013). Best Value Business Model. Simon Frasier University. April 23, 2013. Vancouver, British Columbia, Canada.
18. Sullivan, K., Perrenoud, A., Lines, B. (2013). Interpreting Civil Drawings. Alliance for Construction Excellence Seminar. May 2, 2013. Phoenix, Arizona, USA.
19. Sullivan, K. (2013). An Approach to Value Based Project Delivery for Clients. Dalhousie University. May 8, 2013. Halifax, Nova Scotia, Canada.
20. Sullivan, K. (2013). Best Value Project Process for CSB Vendors. Dalhousie University. May 9, 2013. Halifax, Nova Scotia, Canada.
21. Sullivan, K. (2013). Best Value Project Process General Session. Dalhousie University. May 9, 2013. Halifax, Nova Scotia, Canada.
22. Sullivan, K. and Lines, B. (2013). Organizational Implementation of Value Based Concepts. General Industry Session. Dalhousie University. May 10, 2013. Halifax, Nova Scotia, Canada.
23. Sullivan, K. (2013). Best Value and Organizational Adaptation Seminar. Sponsored by Simon Frasier University Seminar. May 21, 2013. Vancouver, British Columbia, Canada
24. Kashiwagi, J. (2013) Factors of Success in Performance Information Procurement system/Performance Information Risk Management System, Dissertation, Arizona State University.
25. Kashiwagi, D. (2012) “A New Risk Management Model.” Journal of Risk Analysis and Crisis Response, Vol. 2 (4), pp. 233-251.

26. Kashiwagi, D., Kashiwagi, J., Kashiwagi, A., and Sullivan, K. (2012) “Best Value Solution Designed in a Developing Country.” Journal for the Advancement of Performance Information and Value, Vol. 4 (2), pp. 223-239.
27. Kashiwagi, D., Kashiwagi, J., Smithwick, J., Kashiwagi, I., and Kashiwagi, A. (2012) “The Source of Degradation of the Construction Industry Performance.” Journal for the Advancement of Performance Information and Value, Vol. 4 (2), pp. 206-222.
28. Kashiwagi, D., Kashiwagi, J., Kashiwagi, A., and Sullivan, K. (2012) “The Research Model that Revolutionized the Dutch Construction Industry.” Journal for the Advancement of Performance Information and Value, Vol. 4 (2), pp. 133-146.
29. Smithwick, J., Sullivan, K., Stone, B. (2012). “Risk Management Structure for Value-Based Commodity Contracts.” Proceedings of COBRA RICS Construction and Property Conference 2012, Las Vegas, NV, USA, September 10-13, 2012, pp 1470-1477.
30. Sullivan, K., Lines, B., Stewart, B., and Warren, H. (2012). “Impact of Preplanning on Construction Project Success: Pre-Contract Planning Case Study.” Proceedings of COBRA RICS Construction and Property Conference 2012, Las Vegas, NV, USA, September 10-13, 2012, pp 1429-1437.
31. Perrenoud, A. and Sullivan, K. (2012). “Review and Case Study of Interoperability with Building Information Modeling and Facility Management Processes.” Proceedings of COBRA RICS Construction and Property Conference 2012, Las Vegas, NV, USA, September 10-13, 2012, pp 1181-1188.
32. Jeffers, A. and Sullivan, K. (2012). “Is There Balance in Business Process Management?” Proceedings of COBRA RICS Construction and Property Conference 2012, Las Vegas, NV, USA, September 10-13, 2012, pp 1147-1154.
33. Sullivan K., Lines, B., Stone, B., Stewart, B., and Warren, H. (2012). “Change Management Principles: Best Value Implementation Case Study.” Proceedings of COBRA RICS Construction and Property Conference 2012, Las Vegas, NV, USA, September 10-13, 2012, pp 1103-1111.
34. Perrenoud, A., Stone, B., Sullivan, K., and Savicky, J. (2012). “Case Study: The Implementation of a Performance Metric System in a Capital Improvement Organization.” Proceedings of COBRA RICS Construction and Property Conference 2012, Las Vegas, NV, USA, September 10-13, 2012, pp 1095-1102.
35. Sullivan, K. and Oates, H. (2012). “Analysis of Arizona’s LEED for New Construction Population’s Credits.” ASCE Journal of Construction Engineering and Management, Vol. 138 (12), pp. 1377-1385.
36. Barlish, K., Sullivan, K., and De Marco, A. (2012). “Education and Simulation of Best Value in an International Academic Setting: A Case Study” Journal for the Advancement of Performance Information and Value, Vol. 4 (1), pp. 44-62.
37. Oates, H. and Sullivan, K. (2012). “Post Occupancy Energy Consumption Survey of Arizona’s LEED New Construction Population.” ASCE Journal of Construction Engineering and Management, Vol. 138 (6), pp. 742-750.

38. Sullivan, K. and Lines, B. (2012). “Project Management Strategies to Maximize Performance in Exploratory Research: A Case Study in Solar Thermal Energy Storage Technology Development.” ASCE Leadership and Management in Engineering, Vol. 12 (2), pp. 71-80.
39. Barlish, K. and Sullivan, K. (2012). “How to measure the benefits of BIM – A case study approach.” Automation in Construction, Vol. 24 (2012), pp. 149-159.
40. Adeyemi, A., Mselle, P., Kashiwagi, D., and Kashiwagi, J. (2011) “A New Approach to the Delivery of Construction Botswana.” Journal of Civil Engineering and Architecture, Vol. 5 (7), pp. 606-617.
41. Kashiwagi, D. (2011) “Case Study: Best Value Procurement / Performance Information Procurement System Development.” Journal for the Advancement of Performance Information and Value, Vol. 3 (1), pp. 12-45.
42. Kashiwagi, D., and Kashiwagi, J. (2011) “Case Study: Performance Information Procurement System (PIPS) in the Netherlands.” Malaysian Construction Research Journal (MCRJ), Construction Research Institute of Malaysia (CREAM), Vol. 8 (1), pp. 1-17.
43. Meyer, J., Witt, S., Kashiwagi, J., and Kashiwagi, D. (2011) “General Services Administration Tests the Best Value PIPS Paradigm.” Malaysian Construction Research Journal (MCRJ), Construction Research Institute of Malaysia (CREAM), Vol. 8 (1), pp. 18-36.
44. Kashiwagi, D., Kashiwagi, J., Mselle, P., and Adeyemi, A. (2011) “Is the Culture or Unstable Procurement System Causing Nonperforming Projects?” Journal of Civil Engineering and Architecture, Vol. 5 (5), pp. 389-401.
45. Mselle, P., Kashiwagi, J., Kashiwagi, D., Adeyemi, A. (2011) “Risk Management: A New Project Management Perspective.” Journal of Civil Engineering and Architecture, Vol. 5 (6), pp. 505-512.
46. Sullivan, K. (2011). “Quality Management Programs in the Construction Industry: Best Value Compared with Other Methodologies.” ASCE Journal of Management in Engineering, Vol. 27 (4), pp. 210-219.
47. Sullivan, K. and Michael, J. (2011). “Performance Measurement Approach to Contracting and Delivering Design Services.” ASCE Journal of Professional Issues in Engineering Education and Practice, Vol. 137 (4), pp. 248-257
48. Sullivan, K. and McDonald, D. (2011). “Leadership Principles and Performance Measurement in Facilities Management: A Case Study.” ASCE Leadership and Management in Engineering, Vol. 11 (4), pp. 302-309.**Winner of the ASCE 2012 Leadership and Management in Engineering – Best Feature Article Award
49. Sullivan, K., Kashiwagi, J. and Kashiwagi, D. T, (2010), “The Optimizing of Design Delivery Services for Facility Owners.” Journal of Facilities Management, Vol. 8 (10), pp. 26-46.
50. Kashiwagi, D., Smithwick, J., Kashiwagi, J., and Sullivan, K. (2010) “Case Study of a Best Value Manufacturer.” Journal for the Advancement of Performance Information and Value, Vol. 2 (1), pp. 57-86.
51. Sullivan, K., Savicky, J., and Carey, B. (2010). “Best-Value Process Implementation at the City of Peoria: Five Years of Research Testing.” Journal

for the Advancement of Performance Information and Value, Vol. 2 (1), pp. 23-32.

52. Sullivan, K. and Savicky, J. (2010). "Past Performance Information: Analysis of the Optimization of a Performance Evaluation Criteria." Journal for the Advancement of Performance Information and Value, Vol. 2 (1), pp. 13-22.
53. Sullivan, K., Georgoulis, S., and Lines, B. (2010). "Empirical Study of the Current Facility Management Profession." Journal of Facilities Management, Vol. 8 (2), pp. 91-103.
54. Kashiwagi, J., Sullivan, K., and Kashiwagi, D.T. (2009), "Risk Management System Implemented at the US Army Medical Command." Journal of Facilities Management, 7(3) pp.224-245.
55. Kashiwagi, D.T., Kashiwagi, J., and Savicky, J. (2009), "Industry Structure: Misunderstood by Industry and Researchers." Journal of Research, NED University of Engineering and Technology, VI (2) pp.59-76.
56. Sullivan, K., Kashiwagi, D. T., and Chong, N. (2009), "The Influence of an Information Environment on a Construction Organization's Culture: A Case Study." Advances in Civil Engineering, Vol. 2009, Article ID 387608, 10 pages.
57. Sullivan, K. and Guo, Y. (2009). "Contractor Cash Flow and Profitability Analysis between Best Value and Low Bid." Cost Engineering, Vol. 51 (9), pp. 16-20.
58. Badger, W., Sullivan, K., Wiezel, A., Bopp, P. (2009). "Profiling the Leadership of Project Managers." International Journal of Construction Education and Research, Vol. 5 (2), pp. 121-146.
59. Kashiwagi, D. T., Sullivan, K., and Savicky, J. (2008), "Case Study of Sustainability of the PIPS Best Value Program at the University of Minnesota." Journal for the Advancement of Performance Information and Value, 1 (1) pp. 73-82, June.
60. Sullivan, K. and Michael, J. (2008). "Industry Transformation: Testing Best Value and Leadership in Non-Construction Industries." Journal for the Advancement of Performance Information and Value. Vol. 1 (1), pp. 20-34.
61. Hanna, A., Chang, C., Sullivan, K., and Lackney, J. (2008). "Impact of Shift Work on Labor Productivity for Labor Intensive Contractor." ASCE Journal of Construction Engineering and Management, Vol. 134 (3), pp 197-204
62. Kashiwagi, D. T., Ahmed, M. and Sullivan, K. (2007) "Case Study: Best Value Procurement at South Florida Hospital Facility." Journal of Construction Procurement, 13 (2) pp.76-87, November.
63. Kashiwagi J., Kashiwagi, D. T., and Sullivan, K (2007), "Refining the Supply Chain: Schering Plough Procurement of Facility Services." Journal of Construction Procurement, 13 (2) pp.99-107, November.
64. Hanna, A. and Sullivan, K. (2005). "Bridging the Gap between Academics and Practice: A Capstone Design Experience." ASCE Journal of Professional Issues in Engineering Education and Practice, Vol. 131, (1), pp 59-62.

65. Hanna, A., Taylor, C., and Sullivan, K. (2005). “Impact of Extended Overtime on Construction Labor Productivity.” ASCE Journal of Construction Engineering and Management, Vol. 131 (6), pp 734-739.
66. Hanna, A., Menches, C., Sullivan, K., and Sargant, J. (2005). “Factors Affecting Absenteeism in Electrical Construction.” ASCE Journal of Construction Engineering and Management, Vol. 131 (11), pp 1212-1218.
67. Hanna, A. and Sullivan, K. (2004). “Impact of Overtime on Construction Labor Productivity.” Cost Engineering. Vol. 46, No. 4. pp 20-27.
68. Kashiwagi, D.T. and Savicky, J. (2003) “The Cost of 'Best Value' Construction.” Journal of Facilities Management, 2 (3) pp.285-295, December.
69. Kashiwagi, D.T. and Savicky, J. (2003) “Quality and Safety in Construction is a Supply and Demand Issue.” CIOB Construction Information Quarterly, 6 (1) pp.17-22, November.
70. Kashiwagi, D. T., Parmar, D. and Savicky, J. (2003) “The Impact of Minimizing Specifications and Management at the University of Hawaii.” Journal of Facilities Management, 2 (2) pp. 131-141, September.
71. Kashiwagi, D. T. and Byfield, R. (2002) “Case Study of Potential Impact of Subjective Decision Making on Construction Performance.” Journal of Construction Procurement, 8 (2) pp.101-116, November.
72. Kashiwagi, D. T. and Byfield, R. (2002) “Selecting the Best Contractor to Get Performance: On Time, On Budget, Meeting Quality Expectations.” Journal of Facilities Management, 1 (2) pp. 103-116, August.
73. Kashiwagi, D. T. and Tisthammer, T. (2002) “Information Based Delivery System for Sprayed Polyurethane Foam on Roofing.” Journal of Thermal Envelope & Building Science, (26) 1 pp. 33-52, July.
74. Kashiwagi, D. T. and Byfield, R. (2002) “State of Utah Performance Information Procurement System Tests.” ASCE: Journal of Construction Engineering and Management, 128 (4) pp. 338-347, July.
75. Kashiwagi, D. T. and Byfield, R. (2002) “Testing of Minimization of "Subjectivity" in Best Value Procurement by Using Artificial Intelligence Systems in the State of Utah Procurement.” ASCE: Journal of Construction Engineering and Management, 128 (6) pp.496-50.
76. Kashiwagi, D. T., (2002) “Documented Performance of the JOC Construction Delivery System (1994-1998).” Cost Engineering, 44 (6) pp.14-20, June.
77. Kashiwagi, D. T. and Mayo, R. E. (2001) “Best Value Procurement in Construction Using Artificial Intelligence.” Journal of Construction Procurement, 7 (2) pp. 42-59, November.
78. Kashiwagi, D. T. and Mayo, R. E. (2001) “State of Hawaii Selects "Best Value" by Artificial Intelligence.” Cost Engineering, 43 (4) pp. 38-44, April.
79. Kashiwagi, D. T. (1999) “The Development of the Performance Based Procurement System (PBPS).” Journal of Construction Education, 3 (2) pp. 202-214, May.

80. Kashiwagi, D. T. and Al-Sharmani, Z. (1999) “Development of the Job Order Contracting (JOC) Process for the 21st Century.” Journal of Construction Education, 3 (2) pp. 195-203, May.
81. Kashiwagi, D. T. (1999) “Construction Delivery System of the Information.” Age Automation in Construction, 8 (4) pp.417-425, April.
82. Kashiwagi, D. T. and Pandey, M. K. (1999) “Standards for ‘Oversized’ and ‘Severe’ Hail Resistance of Elastomeric Coated Sprayed Polyurethane Foam (SPF) Roofing Systems.” Roofing Research and Standards Development: 4th Volume (ASTM - American Society for Test.
83. Kashiwagi, D. T. and Pandey, M. K. (1998) “Hail Resistance and Performance Analysis of Elastomeric Coated SPF Roof Systems.” RCI Interface: Journal of the Roof Consultant Institute, 16 (7) pp.10-19, July.
84. Kashiwagi, D. T. and Al-Sharmani, Z. (1997) “A Performance-Based Procurement System Used by the State of Wyoming.” Cost Engineering, 39 (12) pp.37-41, December.
85. Kashiwagi, D. T. and Pandey, M. K. (1997) “Impact Resistance of Polyurethane Foam Roofs against Hail.” Journal of Thermal Insulation and Building Envelopes, Vol. 21, pp. 137-152, October.
86. Kashiwagi, D. T., Halmrast, C. T. and Tisthammer, T. (1996) "Intelligent Procurement of Construction Systems.” Journal of Construction Procurement, 2 (1) pp. 56-65, May.
87. Kashiwagi, D. T. (1995) “Performance Based Procurement System for Roofing.” Journal of Thermal Insulation and Building Envelopes, Vol. 19, pp. 49-58, July.
88. Kashiwagi, D. T. and Moor W. C. (1993) “The Relationship between Energy Cost and Conservation Measures, Building design and Insulation Levels.” Journal of Thermal Insulation and Building Envelopes, Vol. 16, pp. 375-394, April.
89. Kashiwagi, D. T. and Badger, W. W. (1991) “Job Order Contracting: A New Contracting Technique for Maintenance and Repair of Construction Projects.” Cost Engineering, 33 (3) pp. 21-24, March.
90. Kashiwagi, D.T. and Moor, W.C. (1986) “Validation of the Polyurethane Foam Roof System.” Journal of Thermal Insulation, Vol. 10, pp. 91-110, October.

Non-Refereed Conference Publications (17):

1. Kashiwagi, D. T. (2013). “Avoiding Risky Projects: A Closer Look at Value Based Contracting and Performance Measurements.” International Facilities Management Association's World Workplace 2013, Philadelphia, PA, October, 4, 2013.
2. Kashiwagi, D. T. (2012). "New Leadership Model: Changing the Playing Field." International Facilities Management Association's World Workplace 2012, San Antonio, TX, November 17, 2012.
3. Kashiwagi, D. T. (2011). “Project Management Model of the Future: Aligning Expertise Instead of the Managing and Controlling.” 5th Annual Project

Management Symposium, University of Texas at Dallas, Dallas, TX, August 11-12, 2011.

4. Kashiwagi, D. T. (2010). "FM of Tomorrow." IFMA World Workplace 2010 Conference & Expo., Atlanta, Georgia; October 29, 2010.
5. Meyer, J., Witt, S., Kashiwagi, D., and Kashiwagi, J. (2010). “General Services Administration Streamlines the Procurement of Construction Services.” 7th Annual Acquisition Research Symposium, Monterey, CA, May 11-13, 2010.
6. Kashiwagi, D. T., Chong, N., Mosby, V., and Vatter, S. (2010) “Why Can’t Professionals be more Professional and Increase their Profits?” American Society for Healthcare Engineering (ASHE) 2010 International Summit & Exhibition on Health Facility Planning, Design, and Construction (PDC). San Diego, CA; March 14-17, 2010.
7. Kashiwagi, D.T. (2009) "How Does Research Fix the Problems of the Construction Industry? By Maximizing Profit, Minimizing Cost, and Transferring Control and Risk Back to the High Performance Contractor." 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, November 3 - 5, 2009.
8. Kashiwagi, D.T. (2009). "Root of all evils: Misunderstanding of Construction Industry Structure" 5th International Structural Engineering and Construction Conference, Las Vegas, NV, September 23 - 25, 2009.
9. Kashiwagi, D. T. (2009). “How to Implement a Best Value Risk Management Model.” 2009 International Conference and Exhibition on Health Facility Planning, Design and Construction, American Society for Healthcare Engineering (ASHE), Phoenix, AZ, March 9, 2009.
10. Kashiwagi, D.T. (2008). "New Revolutionary Project Management Case Studies." PMI Global Congress 2008- North America, Denver, CO, October 21, 2008.
11. Kashiwagi, D. T. (2008) "A New Research Approach." RICS Construction and Building Research Conference, Dublin, Ireland, September 4, 2008.
12. Kashiwagi, D. T. (2008). "Case Study: The Transformation of a Procurement Office." RICS Construction and Building Research Conference, Dublin, Ireland, September 4, 2008.
13. Kashiwagi, D. T., and Kashiwagi, J. (2008). “The Facility Managers Role in the PDC Process.” 2008 International Conference on Health Facility Planning, Design and Construction hosted by ASHE, Orlando, FL, March 11-12, 2008.
14. Kashiwagi, D.T., Chong, N., and Welker R. (2008). "General Contractors Role in Their Seat at the Construction Teams Table." 2008 International Conference on Health Facility Planning, Design and Construction hosted by ASHE, Orlando, FL, March 11-12, 2008.
15. Sullivan, K.T. (2008) Best Value: An efficient construction model. Modern Contractor Solutions, April Issue, pp.30-31.
16. Kashiwagi, D. T. (2007). "Revolutionary PM Model of the Future: A New Risk Management Model." *Project Management Institute (PMI) Global Congress*, Atlanta, GA, October 9, 2007.

17. Chong, N., Sullivan, K., Sullivan, M., and Kashiwagi, D. T. (2007). "The Cultural Revolution." *Naval Postgraduate School (NPS) 4th Acquisition Research Symposium*, Monterey, CA, May 17, 2007.

Refereed Conference Publications (194):

1. Cioara, J., Romero, S., Kashiwagi, D., & Sullivan, K. (2014). “The Transformation of a Construction Contracts Administration Class.” The American Society for Engineering Education (ASEE) 121st Annual Conference, Indianapolis, Indiana (June 15-18, 2014).
2. Hurtado, K.C., Kashiwagi, D. T., & Sullivan, K. T. (2014). “An Assessment Tool for Using Videos and Rich Media in Construction Management Curriculum - A Case Study.” The American Society for Engineering Education) 121st Annual Conference, Indianapolis, Indiana (June 15-18, 2014).
3. Kashiwagi, D., Nihas, S., and Barlish, K. (2013) “Implementation of Best Value in India.” Construction Industry Structure in India.” RICS COBRA Conference 2013, New Delhi, India, pp. 324-330 (September 10-12, 2013).
4. Kashiwagi, D., and Kashiwagi, J. (2013) “Dutch Best Value Effort.” RICS COBRA Conference 2013, New Delhi, India, pp. 349-356 (September 10-12, 2013).
5. Nihas, S., and Barlish, K. and Kashiwagi, D. (2013) “Construction Industry Structure in India.” RICS COBRA Conference 2013, New Delhi, India, pp. 766-773 (September 10-12, 2013).
6. Gajjar, D., Kashiwagi, D., and Kashiwagi, J. (2013) “Use of Performance Information Risk Minimization Program to Identify Problem Projects.” RICS COBRA Conference 2013, New Delhi, India, pp. 897-904 (September 10-12, 2013).
7. Kashiwagi, D., Gajjar, D., Smithwick, J., Kashiwagi, J. (2013) “Implementation of a Real-Time Information System for a Roofing Manufacturer.” ISEC-7, Honolulu, HI, USA pp. (June 18-23, 2013).
8. Kashiwagi, D., Kashiwagi, J., Smithwick, J., Kashiwagi, I., Kashiwagi, A. (2013) “Owner Controlled Delivery of Construction Degrades Quality/Value.” ISEC-7, Honolulu, HI, USA pp. (June 18-23, 2013).
9. Kashiwagi, D., Kashiwagi, A., Kashiwagi, I. (2013) “Challenges to Apply Best Value in Malaysia Construction Industry.” ISEC-7, Honolulu, HI, USA pp. (June 18-23, 2013).
10. Kashiwagi, D., Kashiwagi, J., Kashiwagi, A., Sullivan, K. (2013) “The Solution Behind the Revolutionizing of the Dutch Construction Industry.” ISEC-7, Honolulu, HI, USA pp. (June 18-23, 2013).
11. Stone, B., and Sullivan, K. (2013). “Quantifying Workforce Development: An Empirical Study on the Indicators of Organizational Change.” 2013 Association of Technology, Management and Applied Engineering (ATMAE) Conference, New Orleans LA, USA November 20-23, 2013, http://atmae.org/conference-20.html#pastconfpaper

12. Perrenoud, A. and Sullivan, K. (2013). "Frequency and Timeline of Leadership Transitions within Construction Companies." 49th ASC Annual International Conference Proceedings, San Luis Obispo, CA, USA, April 10-13, 2013, Ref: CPRT74002013.
13. Lines, B. and Sullivan, K. (2013). "Barriers to Implementing New AEC Project Delivery Methods within Owner Organizations: Development of a Process Training Tool." 49th ASC Annual International Conference Proceedings, San Luis Obispo, CA, USA, April 10-13, 2013, Ref: CPRT79002013.
14. Smithwick, J. and Sullivan, K. (2013). "Application of a Risk Management Structure to Minimize Schedule Deviations Under a Commodities Contract." 49th ASC Annual International Conference Proceedings, San Luis Obispo, CA, USA, April 10-13, 2013, Ref: CPRT113002013.
15. Gajjar, D., Sullivan, K., and Kashiwagi, D. (2012) "Manufacturer's Use of End User to Minimize Risk." RICS COBRA Conference 2012, Las Vegas, NV, USA pp. 1869-1875 (September 11-13, 2012).
16. Gajjar, D., Kashiwagi, D., and Kashiwagi, J. (2012) "Manufacturer's New Approach To Risk." RICS COBRA Conference 2012, Las Vegas, NV, USA pp. 1859-1868 (September 11-13, 2012).
17. Smithwick, J. and Kashiwagi, D. (2012) "Best Value System Documents Performance of City's Public Works Department Projects." RICS COBRA Conference 2012, Las Vegas, NV, USA pp. 1833-1840 (September 11-13, 2012).
18. Sullivan, K., Kashiwagi, D., Ferrin, P., and Lines, B. (2012) "Framework for Managing Outsourcing – A Large Scale Services Contract Case Study." RICS COBRA Conference 2012, Las Vegas, NV, USA pp. 1421-1428 (September 11-13, 2012).
19. Greenfeld, L., Gajjar, D., Kashiwagi, D., and Sullivan, K. (2012) "An Educational Approach for Using Performance Criteria in the Roofing Industry." RICS COBRA Conference 2012, Las Vegas, NV, USA pp. 552-559 (September 11-13, 2012).
20. Kashiwagi, J., and Kashiwagi, D. (2011) "The 'Seamless' Bureaucracy." Sixth International Conference on Construction in the 21st Century (CITC VI), Kuala Lumpur, Malaysia (July 5-7, 2011).
21. Kashiwagi, J., and Kashiwagi, D. (2011) "Solving the Malaysian Construction Industry Research Environment." Sixth International Conference on Construction in the 21st Century (CITC VI), Kuala Lumpur, Malaysia (July 5-7, 2011).
22. Kashiwagi, J., and Kashiwagi, D. (2011) "State of the Art Research Model: Brunsfield Research Center." Sixth International Conference on Construction in the 21st Century (CITC VI), Kuala Lumpur, Malaysia (July 5-7, 2011).
23. Kashiwagi, J., and Kashiwagi, D. (2011) "Best Value PIPS Research Reaches Malaysia." Sixth International Conference on Construction in the 21st Century (CITC VI), Kuala Lumpur, Malaysia (July 5-7, 2011).
24. Kashiwagi, D., Sullivan, K., Kashiwagi, J., and Davis-Johnson, M. (2010) "Supply Chain Analysis Impacts Delivery of IT Services: Potential Impact to

Construction." RICS COBRA 2010, University of Dauphine, Paris, France, paper 3 (September 2-3, 2010).

25. Kashiwagi, D., Kashiwagi, J., and Sullivan, K. (2010) "Obstacles in Becoming a Research Institution in Developing Countries." RICS COBRA 2010, University of Dauphine, Paris, France, paper 2 (September 2-3, 2010).
26. Kashiwagi, D., Malhotra, N., Kashiwagi, J., and Sullivan, K. (2010) "Use of Performance Information to Create Transparency in a Large Government Organization." RICS COBRA 2010, University of Dauphine, Paris, France, paper 1 (September 2-3, 2010).
27. Kashiwagi, J., and Kashiwagi, D. (2010) "To Create Decision Support Systems or Replace Decision Making?" IIE/IERC Annual Conference & Expo, Cancun, Mexico, pp. (June 5-9, 2010).
28. Kashiwagi, D. (2010) "The Replacement of Client/Buyer Decision Making with a Deductive Logic Structure." Proceedings of the 2010 Industrial Engineering Conference IIE/IERC Annual Conference & Expo, Cancun, Mexico, pp. (June 5-9, 2010.
29. Child, G., Sullivan, K. and Kashiwagi, D. (2010) "Delivering the Design Services and Other Professional Services." Fifth Scientific Conference on Project Management (PM-05) - Advancing Project Management for the 21st Century, Concepts, Tools & Techniques for Managing Successful Projects, Heraklion, Crete, Greece, pp. (May 29-31, 2010).
30. Kashiwagi, D., Savicky, J., and Sullivan, K. (2010) "Strategic Plan for the Implementation of a New PM Model." Fifth Scientific Conference on Project Management (PM-05) - Advancing Project Management for the 21st Century, Concepts, Tools & Techniques for Managing Successful Projects, Heraklion, Crete, Greece, pp. (May 29-31, 2010).
31. Kashiwagi, J., Sullivan, K. and Kashiwagi, D. (2010) "New Contract Model for Project Management." Fifth Scientific Conference on Project Management (PM-05) - Advancing Project Management for the 21st Century, Concepts, Tools & Techniques for Managing Successful Projects, Heraklion, Crete, Greece, pp. (May 29-31, 2010).
32. Kashiwagi, J., Sullivan, K. and Kashiwagi, D. (2010) "The Decision-Less Environment of the Future PM." Fifth Scientific Conference on Project Management (PM-05) - Advancing Project Management for the 21st Century, Concepts, Tools & Techniques for Managing Successful Projects, Heraklion, Crete, Greece, pp. (May 29-31, 2010).
33. Sullivan, K., Carey, B., Lines, B., and Kashiwagi, D. (2010). "Procurement of Property Management Services in Anthem, AZ (IMT Case Study in Decision Making)," Proceedings CIB World Congress 2010, Manchester, UK, May 10-13, 2010, Paper 1577.
34. Kashiwagi, D., Kashiwagi, J., and Sullivan, K. (2010). "A New Project Management Model," Proceedings CIB World Congress 2010, Manchester, UK, May 10-13, 2010, Paper 1578.

35. Sullivan, K., Cowley, L., and Kashiwagi, D. (2010). “US Department of Defense Procurement Systems Approaching Best Value,” Proceedings CIB World Congress 2010, Manchester, UK, May 10-13, 2010, Paper 1579.
36. Child, G., Kashiwagi, D., and Sullivan, K (2010). “The Design-Construction Industry Needs to Move to Best Value (a Survey of A/E/C Professionals),” Proceedings CIB World Congress 2010, Manchester, UK, May 10-13, 2010, Paper 1580.
37. Kashiwagi, J., Sullivan, K. and Kashiwagi, D. (2009) "The Role of the Professional in the Future Government Organization" 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, CD-Day 2, Session B-2 (November 3-5, 2009).
38. Rubio, E., Kashiwagi, J., Sullivan, K. and Kashiwagi, D. (2009) "Potential Implementation of Best Value in Mexico" 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, CD-Day 2, Session B-3 (November 3-5, 2009).
39. Kashiwagi, J., Smithwick, J., Sullivan, K. and Kashiwagi, D. (2009) "Neogard: The History and Formation of a Best Value Manufacturer" 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, CD-Day 2, Session E-5 (November 3-5, 2009).
40. Kashiwagi, J. and Kashiwagi, D. (2009) "Industry Structure Misunderstood by Industry and Researchers" 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, CD-Day 1, Session B-4 (November 3-5, 2009).
41. Kashiwagi, J., Kashiwagi, D. T., and Malhotra, N. (2009) "Leadership Based Structure Improves Performance" 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, CD-Day 1, Session B-5 (November 3-5, 2009).
42. Kashiwagi, J., Kashiwagi, D. T., and Sullivan, K. (2009) "Graduate Education Research Model of the Future" 2nd Construction Industry Research Achievement International Conference, Kuala Lumpur, Malaysia, CD-Day 2, Session E-4 (November 3-5, 2009).
43. Kashiwagi, D. T. (2009) “Roots of all Evils: Misunderstanding of Construction Industry Structure” The Fifth International Structural Engineering and Construction Conference (ISEC-5), University of Nevada Las Vegas, pp. 15-21 (September 21-27, 2009).
44. Kashiwagi, J. and Kashiwagi, D. (2009) "New Role of Construction Manager/Client Engineer/Quantity Surveyor" RICS COBRA Research Conference, University of Cape Town, pp. 763-774 (September 10-11, 2009).
45. Muatjetjeja, M., Kashiwagi, J., Sullivan, K. and Kashiwagi, D. T., (2009) "Professor Career Progression" RICS COBRA Research Conference, University of Cape Town, pp. 414-425 (September 10-11, 2009).
46. Ntshewene, K., Mselle, P., Kashiwagi, D. T., and Sullivan, K. (2009) "New Project Management Education Curriculum" RICS COBRA Research Conference, University of Cape Town, pp. 302-313 (September 10-11, 2009).

47. Adeyemi, A., Kashiwagi, D. T., and Sullivan, K. (2009) "Acceptance of IMT/PIPS Philosophy in Botswana" RICS COBRA Research Conference, University of Cape Town, pp. 509-521 (September 10-11, 2009).
48. Ntshwene, K., Kashiwagi, J., Sullivan, K. and Kashiwagi, D. T., (2009) "Sustainable Research Platform at the University of Botswana" RICS COBRA Research Conference, University of Cape Town, pp. 332-343 (September 10-11, 2009).
49. Mselle, P., Muatjetjeja, M., Kashiwagi, J. and Sullivan, K. (2009) "US Embassy Botswana: Research Test of Best Value Procurement" CIB TG59 International Conference on People in Construction, Port Elizabeth, South Africa, pp. 325-336 (July 12-14, 2009).
50. Mselle, P., Muatjetjeja, M., Kashiwagi, J. and Sullivan, K. (2009) "Nelson Powder Memorial Contribution to Research Based Graduate Education" CIB TG59 International Conference on People in Construction, Port Elizabeth, South Africa, pp. 313-324 (July 12-14, 2009).
51. Adeyemi, A., Mselle, P., Kashiwagi, D. and Sullivan, K. (2009) "Challenges of a Graduate Project Management Student" CIB TG59 International Conference on People in Construction, Port Elizabeth, South Africa, pp. 300-312 (July 12-14, 2009).
52. Mselle, P., Kashiwagi, J., Kashiwagi, D. and Sullivan, K. (2009) "How to Jumpstart a University of Botswana Project Management Group" Fifth International Conference on Construction in the 21st Century, Istanbul, Turkey, pp. 1080-1088, (May 20-22, 2009).
53. Adeyemiy, A., Ssegawa, J., Kashiwagi, D. and Sullivan, K (2009) "Botswana Construction Procurement Process: A New Approach" Fifth International Conference on Construction in the 21st Century (CITC-V), Istanbul, Turkey, pp. 573-480, (May 20-22, 2009).
54. Mselle, P., Muatjetjeja, M., Kashiwagi, D. and Sullivan, K. (2009) "Can Developing Countries Leapfrog the Project Management Technology of More Developed Countries" Fifth International Conference on Construction in the 21st Century (CITC-V), Istanbul, Turkey, pp.543-552 (May 20-22, 2009).
55. Muatjetjeja, M., Kashiwagi, D., Sullivan, K. and Kashiwagi, J. (2009) "Minimizing the Impact of Culture in Botswana on the Implementation of New PM Paradigms" Fifth International Conference on Construction in the 21st Century (CITC-V), Istanbul, Turkey, pp.533-542 (May 20-22, 2009).
56. Muatjetjeja, M., Adeyemi, A., Kashiwagi, D.T. and Sullivan, K. (2009) "Is it the Culture or an Unstable Procurement Model that Causes Nonperformance in Botswana's Project Management?" Fifth International Conference on Construction in the 21st Century (CITC-V), Istanbul, Turkey, pp. 523-532, (May 20-22, 2009).
57. Mselle P., Muatjetjeja, M., Kashiwagi D. and Sullivan, K. (2009) "Risk Management: A New Project Management Perspective" Fifth International Conference on Construction in the 21st Century (CITC-V) Istanbul, Turkey, pp. 292-299 (May 20-22, 2009).

58. Adeyemi, A., Kashiwagi, J., Kashiwagi D. and Sullivan K. (2009) "New Approach to Teaching Procurement in Graduate Education" Association of Schools of Construction of Southern Africa, The Fourth Built Environment Conference, Zambia, (May 17 – 19, 2009).
59. Mselle P., Muatjetjeju, M., Sullivan, K. and Kashiwagi, D. (2009) "Developing a Research Based MPM Graduate Program" Association of Schools of Construction of Southern Africa, The Fourth Built Environment Conference, Livingstone, Zambia, (May 17 – 19, 2009).
60. Muatjetjeja, M. Mselle P., Kashiwagi, D. and Sullivan, K. (2009) "Development of a Professor in the Project Management Academic Profession" Association of Schools of Construction of Southern Africa, The Fourth Built Environment Conference, Livingstone, Zambia, (May 17 – 19, 2009).
61. Kashiwagi, J., Malhotra, N., Luna, E., Kashiwagi, D., and Sullivan, K. (2009) "Creating Organizational Change: Minimizing Client Generated Construction Inefficiencies at the US Army Medical Command" Construction Research Congress (CRC) Conference Seattle, WA April 5-7, 2009 pp. 370-379 (April 5-7, 2009).
62. Michael, J., Carey, B., and Sullivan, K. (2009) "A New Approach to Contracting Design Professionals." 2009 ASCE Construction Research Congress, Seattle, Washington, USA, pp. 269-278 (April 5-7, 2009).
63. Bonanno, K., Badger, W., Sullivan, K., Wiezel, A., Bopp, P., "Servant Leadership in Construction", ASC International Proceeding of the 44th Annual Conference, Auburn, AL, (paper # CPRT253002008 CD), pp 1-12, 2008
64. Badger, W., Bonanno, K., Sullivan, K., Wiezel, A., and Bopp, P. (2008) "Wisdom Based Leadership Competencies." ASC International Proceeding of the 44th Annual Conference, Auburn University, Auburn, AL, CD 4:7 (April 2- 5, 2008).
65. 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).
66. Kashiwagi, J., Sullivan, M., Sullivan, K. and Kashiwagi, D.T. (2008) "Transforming an Organization by Using a New Project Management Approach" 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. 198-203 (May 29, 2008).
67. Kashiwagi, J., Sullivan, K., Kashiwagi, D.T. and Badger, W. (2008) "Simplification of Projects Using Deductive Models and Dominant Information" 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. 192-197 (May 29, 2008).

68. Kashiwagi, J., Sullivan, K., Kashiwagi, D.T. and Badger, W. (2008) "Is Project Management Alignment or Influence/Control" 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. 186-191 (May 29, 2008).
69. Kashiwagi, J., Sullivan, K. and Kashiwagi, D.T. (2008) "PM Assisted Structure Can Efficiently Improve Performance" 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. 180-185 (May 29, 2008).
70. Kashiwagi, D. T (2008) "Project Managers in a Futuristic Environment" 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. 56-64 (May 29, 2008).
71. Kashiwagi, J., Sullivan, K., Badger, W. and Kashiwagi, D. (2008) "New Leadership Model of Alignment" ASC International Proceedings of the 44th Annual Conference, Auburn University, Auburn, AL, USA, CD-5:14 (April 2, 2008).
72. Kashiwagi, D., Sullivan, K. and Badger, W. (2008) "Case Study of a New Construction Research Model" ASC International Proceedings of the 44th Annual Conference, Auburn University, Auburn, AL, USA, CD-4:2 (April 2, 2008).
73. Goodridge, S., Sullivan, K. and Kashiwagi, D. (2007) "Case Study: Minimization of Best Value Issues in the Procurement of Construction Services at the City of Miami Beach" COBRA 2007 - Construction and Building Research Conference, Georgia Institute of Technology, Atlanta, GA, USA, CD-T68 (September, 6, 2007).
74. Pauli, M., Sullivan, K. and Kashiwagi, D. (2007) "Utilization of Risk Management to Show Value and Increase Competitiveness" COBRA 2007 - Construction and Building Research Conference, Georgia Institute of Technology, Atlanta, GA, USA, CD-T59 (September 6, 2009).
75. Michael, J., Sullivan, K. and Kashiwagi, D. (2007) "Best Value: An 'Enterprise' Model for Delivering Services" COBRA 2007 - Construction and Building Research Conference, Georgia Institute of Technology, Atlanta, GA, USA, CD-T54 (September 6, 2007).
76. Kashiwagi, J., Sullivan, K., Badger, W. and Kashiwagi, D. (2007) "Perceived vs. Actual Industry Value of Leadership Programs" COBRA 2007 - Construction and Building Research Conference, Georgia Institute of Technology, Atlanta, GA, USA, CD-T37 (September 6, 2007).
77. Kashiwagi, J., Sullivan, K., Badger, W. and Kashiwagi, D. (2007) "Changing the Paradigm of Leadership" COBRA 2007 - Construction and Building Research

Conference, Georgia Institute of Technology, Atlanta, GA, USA, CD-T36 (September 6, 2007).

78. Chong, N., Sullivan, K., Egbu, C. and Kashiwagi, D. (2007) "The Influence of an Information Environment on Contractors' Performance through IDIQ Procurement delivery" Conference: Construction Management and Economics: past, present and future, University of Reading, United Kingdom, CME25-CD (July 16, 2007).

79. Sullivan, K. Kashiwagi, D. and Chong, N. (2007) "Motivating Contractor Performance Improvement through Measurement" Fourth International Conference on Construction in the 21st Century (CITC-IV): Accelerating Innovation in Engineering, Management, and Technology, Gold Coast, Australia, CD-T40 (July 11, 2007).

80. Sullivan, K., Savicky, J., Kashiwagi, D., 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-T21 (July 11, 2007).

81. Sullivan, K., Kashiwagi, D., Brown, D. and Kashiwagi, J. (2007) "Best Value Process in the Selection of Software Services" Fourth International Conference on Construction in the 21st Century (CITC-IV): Accelerating Innovation in Engineering, Management, and Technology, Gold Coast, Australia, CD-T15 (July. 11, 2007).

82. K. Sullivan, M. Sullivan, J. Kashiwagi, and D. Kashiwagi (2007) "Minimizing Risk in the Futuristic Environment" 9th International Surveyors' Congress: Managing the Unexpected, Crowne Plaza Mutiara Hotel, KL, Malaysia, Plenary Session 4, Paper 7 (June. 28, 2007).

83. Sullivan, K., Kashiwagi, D., Sullivan, M. and Kashiwagi, J. (2007) "Moving into the Future: The Minimization of Construction Risk by the Surveyor, Professional, and Client" 9th International Surveyors' Congress: Managing the Unexpected, Crowne Plaza Mutiara Hotel, Kuala Lumpur, Malaysia, Plenary Session 2, Paper 4 (June, 28, 2007).

84. Chong, N., Sullivan, K., Sullivan, M. and Kashiwagi, D. (2007) "Cultural Revolution" Naval Post-Graduate School (NPS) 4th Annual Acquisition Research Symposium, Monterey, CA, USA, Panel 15 (May 16, 2007).

85. Sullivan, K. and Kashiwagi, D. (2007) "Implementing Best Value Concepts into the Low Bid Environment" 2007 ASCE Construction Research Congress, Grand Bahamas Island, on CD-T110 (May 6, 2007).

86. Sullivan, K., Guo, Y. and Kashiwagi, D. (2007) "Contractor Cash Flow and Profitability Analysis between Best Value and Low Bid" 2007 ASCE Construction Research Congress, Grand Bahamas Island, on CD-T109 (May 6, 2007).

87. Kashiwagi, D.T., Kashiwagi, J., Sullivan, M. and Sullivan, K. (2007) "Leadership Logic Replaces Technical Knowledge in Best Value Structure/Process." ASC International Proceeding of the 43rd Annual Conference Northern Arizona University, Flagstaff, Arizona, CD 6:10 (April 12, 2007).
88. Kashiwagi, D.T., Goodridge, S., Kashiwagi, J. and Sullivan, K. (2006) "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, UK, pp. 310-321 (November 29, 2006).
89. Goodridge, S., Kashiwagi, D.T., Ahmed, S. and Sullivan, K. (2006) "Case Study: Best Value Procurement at Baptist Hospital South Florida" Symposium on Sustainability and Value through Construction Procurement 2006, CIB W092-Procurement Systems, Digital World Center Salford, UK pp. 206-217 (November 29, 2006).
90. Goodridge, S., Ahmed, S., Kashiwagi, D.T., Sullivan, K. and Cano, J. (2006) "A New AE Design Delivery Model" Symposium on Sustainability and Value through Construction Procurement 2006, CIB W092-Procurement Systems, Digital World Center Salford, UK pp. 194-205 (November 29, 2006).
91. Pauli, C., Kashiwagi, D.T., Sullivan, K. and Kashiwagi, M. (2006) "Facility Owner Risk Mitigation" ASCE Texas Branch Fall Meeting, San Antonio, TX (Oct. 11-14, 2006).
92. Sullivan, K., Badger, W., Kashiwagi, D.T. and Okamura, P. (2006) "A New Initiative - Facility Management Research Institute" COBRA 2006-Construction and Building Research Conference University College, London, England Ref. 3 (September 7, 2006).
93. Sullivan, K., Kashiwagi, D.T., Badger, W., Sullivan, M., Egbu M. and Chang, C. (2006) "Leadership, the Information Environment, and the Performance Measuring Project Manager (#480)" Association of Researchers in Construction Management (ARCOM) 23rd Annual Conference University of Central England Birmingham, England pp. 113-122 (September 4, 2006).
94. Sullivan, K., Kashiwagi, D.T., Savicky, J., Egbu M. and Chang, C. (2006) "Increasing Performance by Minimizing the Passing of Information (#477)" Association of Researchers in Construction Management (ARCOM) 23rd Annual Conference University of Central England Birmingham, England pp. 103-122 (September 4, 2006).
95. Kashiwagi, D.T., Sullivan, K. and Badger, W. (2006) "Future Research Model of the New University" International Conference in the Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 463-473 (June 13, 2006).
96. Kashiwagi, D.T., Chong, N., Pauli, M., Sullivan, K. and M. Kashiwagi, M. (2006) "Reduced Information Flow Maximizes Construction Performance" International Conference in the Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 643-652 (June 13, 2006).
97. Kruus, M., Sullivan, K., Kashiwagi, D., and Kiiras, J. (2006) "Selection Process of Construction Management Service Provider" International Conference in the

Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 539-550 (June 13, 2006).
98. Kashiwagi, D.T., Kashiwagi, M. and Sullivan, K. (2006) "The Impact of Education of Construction Clients" International Conference in the Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 513-524 (June 13, 2006).
99. Kashiwagi, D.T., Tang, Z. and Sullivan, K. (2006) "Potential Best Value Construction In China" International Conference in the Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 421-430 (June 13, 2006).
100. Kashiwagi, D.T., Sullivan, K., Savicky, J. and Kruus, M. (2006) "Client Project / Construction Management: The Counterintuitive Approach" International Conference in the Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 247-258 (June 13, 2006).
101. Salmikivi, T., Sullivan, K., Kashiwagi, D., and Kiiras, J. (2006) "Minimizing Specifications By Performance Based Selection of Specialty Contractors (System design and build)" International Conference in the Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 205-216 (June 13, 2006).
102. Kashiwagi, D.T., Sullivan, K., Chong, N. and Pauli, M. (2006) "The 'A' Team Environment" International Conference in the Built Environment in the 21 st Century (ICiBE 2006) Kuala Lumpur, Malaysia, pp. 121-132 (June 13, 2006).
103. Kashiwagi, D.T., Sullivan, K., Okamura, P., Saari, A., and Salmikivi, T. (2006) "The "Information Worker" Facility Manager" CIB W70 2006 Trondheim International Symposium Trondheim, Norway, pp. 357-367 (June 12, 2006).
104. Kashiwagi, D.T., Sullivan, K., Kashiwagi, M. and Saari, A. (2006) "The Impact of Education of Facility Management" CIB W70 2006 Trondheim International Symposium Trondheim, Norway, pp. 211-220 (June 12, 2006).
105. Sullivan, K., Kashiwagi, D.T., Koebergen, H. and Zenko, D. (2006) "Bridging the Gap: Performance and Efficiency in Design Build Delivery" ASC International Proceedings of the 42nd Annual Conference Colorado State University, Fort Collins, CO CD-T20 (April 19, 2006).
106. Sullivan, K., Kashiwagi, D.T., Krus, M. and Egbu, C. (2006) "Comparison of the Risk Minimization Ability of Best Value with that of Low-Bid Procurement" ASC International Proceedings of the 42nd Annual Conference Colorado State University, Fort Collins, CO CD-T19 (April 19, 2006).
107. Sullivan, K., Kruus, M., Kashiwagi, D.T. and Kiras, J. (2005) "Ensuring Design Documents Fitness in Construction Management (CM) Projects" 2005 International Conference on Construction & Real Estate Management (ICCREM) Penang, Malaysia, pp. 258-263 (December 12, 2005).
108. Kashiwagi, D.T., Murphy, P., Kovel, J., Sullivan, K., Kashiwagi, M. and Ahmed, S. (2005) "Leadership Required to Change the Culture of Construction" Construction in the 21st Century - CITC III Athens, Greece Paper 90 on CD (September 15, 2005).

109. Kashiwagi, D.T., Okamura, P., Sullivan, K., Kashiwagi, M. and Ahmed, S. (2005) "The Facility Manager Information Worker of the Future" Construction in the 21st Century - CITC III Athens, Greece Paper 75 on CD (September 15, 2005).
110. Baretta, J., Kovel, J., Sullivan, K., Kashiwagi, M. and Kashiwagi, D.T. (2005) "Minimizing Elements of Control of a Construction Contractor" 11th Joint CIB International Symposium- Combining Forces; Advancing Facilities Management and Construction through Innovation Helsinki, Finland CD: 296-304 (June 17, 2005).
111. Kashiwagi, D.T. and Sullivan K. (2005) "Is Performance-Based Procurement a Solution to Construction Performance?" 11th Joint CIB International Symposium- Combining Forces; Advancing Facilities Management and Construction through Innovation, Helsinki, Finland CD: 172-182 (June 17, 2005).
112. Okamura, P., Kovel, J., Sullivan, K., Kashiwagi, M. and Kashiwagi, D.T. (2005) "LEED-EB in Facilities Management" ASC International Proceedings of the 41st Annual Conference, University of Cincinnati, Ohio CD-T6 (April 6, 2005).
113. Canori, V., Sullivan, K., Kashiwagi, D.T. and Kashiwagi, M. (2005) "The Ramifications of Quality Assurance / Quality Control" ASC International Proceedings of the 41st Annual Conference, University of Cincinnati, Ohio CD-T6 (April 6, 2005).
114. Sullivan, K., Kashiwagi, M. and Kashiwagi, D.T. (2005) "Transforming the MEDCOM Facilities/Construction Management Environment into an Information Environment" ASC International Proceedings of the 41st Annual Conference, University of Cincinnati, Ohio CD-T6 (April 6, 2005).
115. Sullivan, K., Kashiwagi, M. and Kashiwagi, D.T. (2005) "Obstacles with Understanding Best Value Practices" ASC International Proceedings of the 41st Annual Conference, University of Cincinnati, Ohio CD-T5 (April 6, 2005).
116. Sullivan, K., Kashiwagi, D.T., Carroll, B., Lee, M. and Kashiwagi M. (2005) "Research to Correct the Problems of the Regulators of Client's Risk" ASC International Proceedings of the 41st Annual Conference, University of Cincinnati, Ohio CD-T5 (April 6, 2005).
117. Kashiwagi, D.T., Sullivan, K., Greenwood, D., Kovell, J. and Egbu, C. (2005) "Source of Construction Industry Instability and Performance Problems" ASCE Construction Research Congress: Broadening Perspectives San Diego, CA pp. 419-423 (April 5, 2005).
118. Parmar, D., Sullivan, K., Egbu, C., Greenwood, D. and Kashiwagi, D.T. (2005) "Statistical Comparison of Performance Based Procurement and Price Based Procurement" ASCE Construction Research Congress: Broadening Perspectives - San Diego, CA pp. 409-413 (April 5, 2005).
119. Sullivan, K., Egbu, C. and Kashiwagi, D.T. (2005) "Forcing Contractors to Improve with Minimized Management Effort" CIB W92 Construction Procurement: The Impact of Cultural Differences and Systems on Construction Performance University of Nevada – Las Vegas (UNLV), Las Vegas, NV, Vol. 2. pp. 683-691 (February 8, 2005).

120. Sullivan, K., Egbu, C. and Kashiwagi, D.T. (2005) "Sustainability of the Facility Manager: Movement from Management to Leadership" CIB W92 Construction Procurement: The Impact of Cultural Differences and Systems on Construction Performance, University of Nevada – Las Vegas (UNLV), Las Vegas, NV, Vol. 2. pp. 655-663 (February 8, 2005).
121. Hanna, A.S., Chang, C.K., Lackney, J.A., and Sullivan, K.T. (2005) "Overmanning Impact on Construction Labor Productivity." Construction Research Congress: Broadening Perspectives, ASCE, San Diego, CA, p.75 (April 5-7, 2005).
122. Hanna, A.S., Chang, C.K., Sullivan, K.T., and Lackney, J.A. (2005) "Shiftwork Impact on Construction Labor Productivity." Construction Research Congress: Broadening Perspectives, ASCE, San Diego, CA, p.59 (April 5-7, 2005).
123. Chang, C.K., Hanna, A.S., Sullivan, K.T., and Lackney, J.A. (2005) "Quantifying the Impact of Schedule Compression on Construction Labor Productivity." Construction Research Congress: Broadening Perspectives, ASCE, San Diego, CA, p.58 (April 5-7, 2005).
124. Olomolaiye, A., Liyanage, C.L., Egbu, C. and Kashiwagi, D.T. (2004) "Knowledge Management for Improved Performance in Facilities Management" COBRA 2004 - Construction and Building Research Conference Leeds Metropolitan University, Thorpe Park, Leeds, UK. CD-T9 (September 7, 2004).
125. Kashiwagi, D.T., Parmar, D. and Egbu, C. (2004) "Comparison of Risk Minimization ability of Traditional Low-bid Procurement System and Performance Information Procurement System (PIPS) in Construction Industry in the USA." COBRA 2004 - Construction and Building Research Conference Leeds Metropolitan University, Thorpe Park, Leeds, UK. CD-T3 (September 7, 2004).
126. Kashiwagi, D.T., Koebergen, H. and Egbu, C. (2004) "Construction Nonperformance is a Process Problem" COBRA 2004 - Construction and Building Research Conference, Leeds Metropolitan University, Thorpe Park, Leeds, UK. CD-T2 (September 7, 2004).
127. Kashiwagi, D.T., Egbu, C., Kovel, J. and Badger, W. (2004) "Leadership vs. Management in the Construction Industry" Association of Researchers in Construction Management (ARCOM) 20th Annual Conference Heriot Watt University, Edinburgh, UK pp. 1005-1015 (September 1, 2004).
128. Kashiwagi, D.T., Savicky, J. and Parmar, D. (2004) "Traditional Low-bid Procurement System Vs. Performance Information Procurement System (PIPS) in Construction Industry" Association of Researchers in Construction Management (ARCOM) 20th Annual Conference Heriot Watt University, Edinburgh, UK pp. 703-709 (September 1, 2004).
129. Kashiwagi, D.T., Chong, N., Costilla, M., McMenimen, F. and Egbu, C. (2004) "Impact of Six Sigma on Construction Performance" Association of Researchers in Construction Management (ARCOM) 20th Annual Conference Heriot Watt University, Edinburgh, UK pp. 13-23 (September 1, 2004).

130. Kashiwagi, D.T. (2004) "Six Sigma Applications in Construction" ASC Proceedings of the 40th Annual ASC Conference Brigham Young University, Provo, UT. CD-T41 (April 8, 2004).
131. Kashiwagi, D.T. and Parmar, D. (2004) "Past Performance Information in the Construction Industry" ASC Proceedings of the 40th Annual ASC Conference Brigham Young University-Provo, UT., CD T22 (April 8, 2004).
132. Kashiwagi, D.T. and Savicky, J. (2004) "Insurance Rates Validates the Construction Industry Structure Model" ASC Proceedings of the 40th Annual ASC Conference-Brigham Young University - Provo, UT., CD-T03 (April 8, 2004).
133. Kashiwagi, D.T. and Murphy, J. (2004) "A Contractor's Profit Analysis" ASC Proceedings of the 40th Annual ASC Conference - Brigham Young University-Provo, UT., CD-T43 (April 8, 2004).
134. Badger, W. and Kashiwagi, D.T. (2004) "Leadership Principles vs. Management Control" Proceedings of the 2004 Specialty Conference on Leadership and Management in Construction pp. 313-322.
135. Kashiwagi, D.T., Maxey, E. and Savicky, J. (2004) "The Sustainability of the Design Professional in the Low-Bid Procurement Award" CIB W92 Symposium on Project Procurement for Infrastructure Construction, Indian Institute of Technology, Madras, Chennai, India, pp.335-343 (January 7, 2004).
136. Kashiwagi, D.T. and Savicky, J. (2004) "The Implementation of Performance Information in the Design-Bid-Build Process" CIB W92 Symposium on Project Procurement for Infrastructure Construction, Indian Institute of Technology, Madras, Chennai, India, pp. 103-110 (January 7, 2004).
137. Kashiwagi, D.T., Savicky, J. and Parmar, D. (2004) "Impact of Performance Based Procurement on Knowledge Management" CIB W92 Symposium on Project Procurement for Infrastructure Construction, Indian Institute of Technology, Madras, Chennai, India, pp.94-102 (January 7, 2004).
138. Kashiwagi, D.T., Savicky, J. and Parmar, D. (2003) "Performance Information and the Developing Country" Joint International Symposium of CIB Working Commissions: W55 Building Economics, W65 Organization & Management of Construction, W107 Construction in Developing Countries; Singapore, Vol. 2, pp.558-566 (October 22, 2003).
139. Kashiwagi, D.T. and Savicky, J. (2003) "The Value of Construction Using Transaction Costs" Joint International Symposium of CIB Working Commissions: W55 Building Economics, W65 Organization & Management of Construction, W107 Construction in Developing Countries; Singapore, Vol. 1, pp.413-422 (October 22, 2003).
140. Kashiwagi, D.T., Savicky, J. and Parmar, D. (2003) "Case Study of the University of Hawaii Implementation of Performance Based Procurement" Joint International Symposium of CIB Working Commissions: W55 Building Economics, W65 Organization & Management of Construction, W107 Construction in Developing Countries; Singapore, Vol. 1, pp.395-402 (October 22, 2003).

141. Kashiwagi, D.T. and Savicky, J. (2003) "A Case Study of the Transaction Cost and Value of the Delivering of Construction" Association of Researchers in Construction Management (ARCOM) 19th Annual Conference, University of Brighton, UK, Vol. 2, pp. 477-484 (September 3, 2003).
142. Kashiwagi, D.T., Savicky, J. and Parmar, D. (2003) "Case Study of the Impact of Specifications, Construction Management, and Inspection on Construction Performance" Association of Researchers in Construction Management (ARCOM) 19th Annual Conference, University of Brighton, UK, Vol. 1, pp.369-377 (September 3, 2003).
143. Kashiwagi, D.T., Savicky, J. and Parmar, D. (2003) "Case Study of the Dallas Independent School District's Construction Value" Association of Researchers in Construction Management (ARCOM) 19th Annual Conference, University of Brighton, UK, Vol. 1, pp13-21 (September 3, 2003).
144. Kashiwagi, D.T., Savicky, J. and Parmar, D. (2003) "The Use of Performance Information in the Delivery of Construction" COBRA 2003 - Construction and Building Research Conference, University of Wolverhampton, UK, pp. 385-393 (October 22, 2003).
145. Kashiwagi, D.T., Savicky, J., Lynch, J. and Eder, K. (2003) "Use of the Performance Information as a Minimum Qualification" COBRA 2003 - Construction and Building Research Conference, University of Wolverhampton, UK, pp. 359-369 (September 1, 2003).
146. Kashiwagi, D.T., Savicky, J. and Maxey E. (2003) "Selecting Designers Using of the Performance Information Procurement System (PIPS)" COBRA 2003 - Construction and Building Research Conference University of Wolverhampton, UK, pp. 443-455 (September 1, 2003).
147. Kashiwagi, D.T. (2003) "Identify True Value of Construction" 47thAnnual AACE International Meeting Orlando, FL, Track-IT.03 on CD (June 22, 2003).
148. Kashiwagi, D.T. and Slater, C. (2003) "Impact of Information Concepts on Construction Performance" ASCE 2003 Construction Research Congress, Honolulu, HI ; CD-T1-2 (March 19, 2003).
149. Kashiwagi, D.T. and Savicky, J. (2003) "Case Study of the Implementation of the Performance Information Procurement System at the Dallas Independence School District" Associated Schools of Construction, International Proceedings of the 39th Annual Conference Clemson, SC, pp. 315-323 (February 10, 2003).
150. Kashiwagi, D.T. (2003) "Application of Performance Based System in the Pavement Contracting" Associated Schools of Construction, International Proceedings of the 39th Annual Conference Clemson, SC, pp. 303-314 (February 10, 2003).
151. Kashiwagi, D.T., Savicky, J. and Pan, Y. (2002) "The Impact of a Political Environment on the Ability of a Government Group to Procure Performing Construction" 1st International Conference of the CIB Working Commission (W107) on Construction in Developing Countries Johannesburg, South Africa, pp. 465-476 (November 11, 2002).

152. Kashiwagi, D.T. and Johnson, K. (2002) "The Impact on the Changing Construction Industry on Architectural & Engineering Design Services" 1st International Conference of the CIB Working Commission (W107) on Construction in Developing Countries; Johannesburg, South Africa, pp. 455-464 (November 11, 2002).
153. Kashiwagi, D.T., Savicky, J. and Massner, S. (2002) "The Difficulty of the US Federal Government to move from the design-bid-build to "best value" construction" 1st International Conference of the CIB Working Commission (W107) on Construction in Developing Countries Johannesburg, South Africa, pp. 445-454 (November 11, 2002).
154. Kashiwagi, D.T. and Slater, C. (2002) "Impact of Drucker's Knowledge Worker and JIT on Best Value Selection and Contractor Development" 1st International Conference of the CIB Working Commission (W107) on Construction in Developing Countries Johannesburg, South Africa, pp. 437-444 (November 11, 2002).
155. Kashiwagi, D.T. and Savicky, J. (2002) "Resistance to Best Value Procurement in the Construction Industry" W65 - CIB 2002 10th International Symposium; Cincinnati, OH; Vol. 2, pp. 788-798 (September 10, 2002).
156. Kashiwagi, D.T. and Savicky, J. (2002) "The Impact of Information on the Construction Industry Structure" W65 - CIB 2002 10th International Symposium; Cincinnati, OH; Vol. 1, pp.670-679 (September 9, 2002).
157. Kashiwagi, D.T. and Byfield, R. (2002) "Case Studies of the State of Hawaii and Utah Implementation of Performance Based Contracting" COBRA 2002 - Construction and Building Research Conference, Notting ham Trent University, UK; Vol. 1, pp. 297-309 (September 5, 2009).
158. Kashiwagi, D.T. and Khiyara, B. (2002) "The Optimization of Value Engineering as a Structural Component of the Construction Procurement Process" COBRA 2002 - Construction and Building Research Conference Notting ham Trent University, UK; Vol. 1 pp. 83-95 (September 5, 2002).
159. Kashiwagi, D.T. and Mohammed, M. (2002) "A Study Comparing US Construction Delivery Systems Based on Business and Management Principles" COBRA 2002 - Construction and Building Research Conference, Notting ham Trent University, UK; Vol. 1 pp. September 5, 2002).
160. Kashiwagi, D.T., Slater, C. and Kashiwagi, M. (2002) "Just In Time Information for Performance Based Systems" Association of Researchers in Construction Management (ARCOM) 18th Annual Conference, Northubria, UK; Vol.2 pp.577-586 (September 2, 2002).
161. Kashiwagi, D.T. (2002)"Application of Information Measurement Theory (IMT) to Construction" Association of Researchers in Construction Management (ARCOM) 18th Annual Conference, Northubria, UK; Vol. 2 pp.511-521 (September 2, 2002).
162. Kashiwagi, D.T. and Byfield, R. (2002) "Minimizing Political Influence in Performance Contracting" Association of Researchers in Construction

Management (ARCOM) 18th Annual Conference, Northubria, UK; Vol. 1, pp.349-358 (September 2, 2002).

163. Kashiwagi, D.T. and Touchet, K.P. (2002) "The Information Solution to Handicapped Access Ramp Requirements" First International Conference on Construction in the 21st Century; Miami, FL, pp. 809-814 (April 25, 2002).

164. Kashiwagi, D.T. and Savicky, J. (2002) "Causes of Construction Delivery Complexity and Nonperformance" First International Conference on Construction in the 21st Century; Miami, FL pp. 371-377 (April 25, 2002).

165. Kashiwagi, D.T. and Savicky, J. (2002) "The Relationship between the Specification, Low-Bid Process and Construction Nonperformance" First International Conference on Construction in the 21st Century; Miami, FL pp. 371-377 (April 25, 2002).

166. Kashiwagi, D.T., Savicky, J. and Kashiwagi, A. (2002) "Analysis of the Performance of 'Best Value' Procurement in the State of Hawaii" ASC Proceedings of the 38th Annual Conference Virginia Polytechnic Institute and State University - Blacksburg, Virginia, pp. 373-380 (April 11, 2002).

167. Kashiwagi, D.T. and Touchet, K.P (2002) "Is Performance Contracting a Solution to Curb Ramp Optimization?" ASC Proceedings of the 38th Annual Conference Virginia Polytechnic Institute and State University - Blacksburg, Virginia. pp. 365-372 (April 11, 2002).

168. Kashiwagi, D.T. and Erdmann, R. (2002) "Effectiveness of the Specification, Low-Bid Construction Delivery System" ASC Proceedings of the 38th Annual Conference - Virginia Polytechnic Institute and State University - Blacksburg, Virginia, pp. 335-364 (April 11, 2002).

169. Kashiwagi, D.T. and Gardener, G. (2002) "The Movement of the Federal Government From "Low-Bid" Award to 'Best Value'." ASC Proceedings of the 38th Annual Conference - Virginia Polytechnic Institute and State University - Blacksburg, Virginia, pp. 273-280 (April 11, 2002).

170. Kashiwagi, D.T. and Massner, S. (2002) "Solving the Construction Craftsperson Skill Shortage Problem Through Construction Undergraduate and Graduate Education" ASC Proceedings of the 38th Annual Conference - Virginia Polytechnic Institute and State University - Blacksburg, Virginia, pp. 165-176 (April 11, 2002).

171. Kashiwagi, D.T. (2002) "The Difficulty in Implementing Performance Specifications in the Construction Industry" CIB W-92 Joint Symposium: Procurement Systems & Technology Transfer; Trinidad & Tobago, pp. 275-287 (January 14, 2002).

172. Kashiwagi, D.T. (2002) "Minimizing the Risk of Construction Nonperformance" CIB W-92 Joint Symposium: Procurement Systems & Technology Transfer; Trinidad & Tobago, pp. 623-638 (January 14, 2002).

173. Kashiwagi, D.T. and Cotts, D.G. (2001) "Getting it right! Selecting the Right Contractor for the Right Job" PMI 2001 Symposium; Nashville, TN, On CD (November 7, 2001).

174. Kashiwagi, D.T. (2001) "Best Value Procurement Using Artificial Intelligent 'Modified Displaced Ideal Model'." ANNIE Conference: Intelligent Engineering Systems through Artificial Neural Networks St Louis, MO, pp. 1031-1036 (November 4, 2001).
175. Kashiwagi, D.T. and Mayo, R.E. (2001) "Procurement of Construction in the 21st Century" COBRA 2001, Vol. 2; Glasgow University with the RICS Research Foundation, Glasgow, Scotland, Vol. 2, pp. 535-545 (September 5, 2001).
176. Kashiwagi, D.T. (2001) "Identification of Value of Building Envelope Elements Using Artificial Intelligence" ICBEST 2001 Symposium, Ottawa, Canada, Vol. 2, pp.239-243 (June 28, 2001).
177. Kashiwagi, D.T. (2000) "Artificial Intelligent Performance-Based Procurement System" Construction Congress VI; Orlando, FL 49-58 (February 20, 2000).
178. Kashiwagi, D.T. (1998) "Standards for Oversized and Severe Hail Resistance of Elastomeric-Coated Sprayed Polyurethane Foam (SPF) Roofing Systems" 4th Symposium on Roofing Research and Standards Development (ASTM Symposium), Nashville, TN, 4, pp.73-90, (December 12, 1998).
179. Kashiwagi, D.T. (1997) "Hail Resistance Test of Sprayed Polyurethane Foam (SPF) Roof Systems" Fourth International Symposium on Roofing Technology; Gaithersburg, MD, pp. 217-224 (September 17, 1997).
180. Kashiwagi, D.T. (1997) "The Development of the Performance Based Procurement System" 33rd Annual Conference of the Associated Schools of Construction; Seattle, WA, pp. 275-284 (April 2, 1997).
181. Kashiwagi, D.T. and Al-Sharmani, Z. (1997) "Development of Job Order Contracting (JOC) Process for the 21st Century" 33rd Annual Conference of the Associated Schools of Construction; Seattle, WA., pp. 259-266 (April 2, 1997).
182. Kashiwagi, D.T. (1996) "Construction Regulated By Performance Information" The Organization of Management of Construction: Shaping Theory & Practice, Glasgow, Scotland, Vol. 3, pp. 150-159 (August 31, 1996).
183. Kashiwagi, D.T. and Halmrast, C.T. (1996) "Performance Standards Derived by the Management of Information and Artificial Intelligence" Computing in Civil Engineering: Proceeding of the Third Congress; Anaheim, CA, pp. 551-558 (June 17, 1996).
184. Kashiwagi, D.T. (1995) "Reducing Facility Maintenance Cost Using Fuzzy Logic and the Management of Information" Construction Congress; American Society of Civil Engineering; San Diego, CA, pp. 149-156 (October 22, 1995).
185. Kashiwagi, D.T. (1995) "Using Fuzzy Logic and the Management of Information to Increase the Performance of Construction Systems" Associated Schools of Construction: Proceedings of the 31st Annual Conference; Tempe, AZ, pp. 211-217 (April 6, 1995).
186. Kashiwagi, D.T. and Moor, W.C. (1995) "Application of Backward Chaining, "Fuzzy Logic," and the Management of Information to Procurement of Facility Systems/Services" 17th International Conference on Computers and Industrial Engineering: Future Challenges for Industrial Engineering; Phoenix, AZ, pp. 399-403 (March 5, 1995).

187. Kashiwagi, D.T., Nuno J.P. and Moor, W.C. (1994) "Optimizing Facility Maintenance Using Fuzzy Logic and the Management of Information" 16th International Conference on Computers and Industrial Engineering; Ashikaga, Japan, pp. 404-407 (March 7, 1994).
188. Kashiwagi, D.T. (1993) "Performance Based Management of Construction Utilizing "Fuzzy Logic", Artificial Intelligence, and Performance Factors" CIB W-65 7th Int'l Symposium; Organization & Management Construction: The Way Forward; Port of Spain, Trinidad, pp. 91-101 (September 15, 1993).
189. Kashiwagi, D.T., McPherson, S., Watts, D. and Edwards, S. (1992) "Utilization of Fuzzy Logic in the Prioritization and Monitoring of Environmental Restoration, Compliance and Pollution Prevention Projects" 10th National Conference on Microcomputers in Civil Engineering Orlando, FL, pp.68-72 (November 9, 1992).
190. Kashiwagi, D.T., Moor, W.C., Nuno, J.P. and Badger, W.W. (1992) "Evaluation of Robotics in the Application of PUF Roofing" The 9th International Symposium on Automation and Robotics in Construction; Tokyo, Japan, pp. 207-214 (June 3, 1992).
191. Kashiwagi, D.T., Moor, W., Nuno, J.P. and Badger, W.W (1992) "The Effect of Artificial Intelligence on the Determination of Roof Performance and Test Standards" VIII Congreso Internacional: Association Internacional De La Impermeabilizacion; Madrid, Spain pp. 96-111 (May 20, 1992).
192. Kashiwagi, D.T., Nuno, J.P. and Badger, W.W. (1991) "Selection of Optimum Facility Systems by Artificial Intelligence" National Conference on Microcomputers in Civil Engineering pp. 148-152 (October 1, 1991).
193. Kashiwagi, D.T., Moor, W.C. and Beaumeraige T. (1991) "The Development of an Expert System/Database for PUF Roof System Specification, Design, and Analysis" Third International Symposium on Roofing Technology, pp. 189-201 (April 17, 1991).
194. Kashiwagi, D.T. (1985) "The Economic Feasibility of the Polyurethane Foam Roof System" Second International Symposium on Roofing Technology, pp. 106-111.

Books Published (29):

1. Kashiwagi, D.T. (2014). “2014 Information Measurement Theory.” Kashiwagi Solution Model, Mesa, AZ, ISBN: 978-0-9850496-5-2.
2. Kashiwagi, D.T. (2014). “2014 Best Value Standard.” Kashiwagi Solution Model Inc., Mesa, AZ, ISBN: 978-0-9850496-4-5.
3. Kashiwagi, D.T. (2013). “2013 Best Value Standard.” Kashiwagi Solution Model Inc., Mesa, AZ, ISBN: 978-0-9850496-2-1.
4. Kashiwagi, D.T. (2013). “2013 Information Measurement Theory.” Kashiwagi Solution Model, Mesa, AZ, ISBN: 978-0-9850496-3-8.
5. Kashiwagi, D.T. (2012). “Best Value Standard.” Kashiwagi Solution Model Inc., Mesa, AZ, ISBN: 978-0-9850496-0-7.

6. Kashiwagi, D.T. (2012). “Information Measurement Theory.” Kashiwagi Solution Model, Mesa, AZ, ISBN: 978-1-9850496-1-4.
7. Kashiwagi, D. T. (2011). “Information Technology Theory: A Revolutionary Approach to Project Management.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-31-2.
8. Kashiwagi, D. T. (2011). “PIPS/PIRMS: The Best Value Standard.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-32-9.
9. Kashiwagi, D. T. (2010). “Best Value: Performance Information Procurement System (PIPS) and Performance Information Risk Management System (PIRMS).” Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-28-2.
10. Kashiwagi, D. T. (2010). “A Revolutionary Approach to Project Management and Risk Management.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-30-5.
11. Kashiwagi, D. T. (2009). “A Revolutionary Approach to Project Management and Risk Minimization.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-17-6.
12. Kashiwagi, D. T. (2008). “Best Value Procurement 3rd Edition” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-27-0.
13. Morledge, R., Smith, A., and Kashiwagi, D. T. (2006). “Building Procurement” Blackwell Publishing Ltd., ISBN: 10:0-632-06466-8 and 13:978-0-632-06466-3.
14. Kashiwagi, D. T. (2004). “Best Value Procurement: How to use information systems to minimize risk, increase performance, and predict future success.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-25-4.
15. Kashiwagi, D. T. (2004). “Best Value Procurement 2nd Edition” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-26-2.
16. Kashiwagi, D. T. and Savicky, J. (2003). “Hail Resistance of the Alpha Sprayed Polyurethane Foam Roof System” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-07-6.
17. Kashiwagi, D. T. (2002). “Information Measurement Theory (IMT) 7th Edition.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-24-6.
18. Kashiwagi, D. T., Mayo, R. E. and Wen, G. (2001). “Performance Information of SMACNA, Union and Non-Union Contractors” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-06-8.
19. Dean T. Kashiwagi (1999). “Alpha Standard Sprayed Polyurethane Foam (SPF) Systems.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-14-9.
20. Kashiwagi, D. T., Conner, J. and Savicky, J. (1999). “SMACNA Contractors Performance Information.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-16-5.
21. Kashiwagi, D. T. (1998) “Job Order Contracting Performance 1998.” Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-18-1.

22. Kashiwagi, D. T. (1997). "Job Order Contracting Performance 1997."Dean T. Kashiwagi, Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-12-2.
23. Kashiwagi, D. T. and Conner, J. (1997). "Roofing Contractors – System Performance Information, 1997." Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-03-3.
24. Kashiwagi, D. T. and Manoj, P. K. (1996). "Hail Resistance of SPF Roof Systems." Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-00-9.
25. Kashiwagi, D. T., and Scott Ryan (1996). "Arizona Construction Industry Performance." Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-01-7.
26. Kashiwagi, D. T., Halmrast, C. and Conner, J. (1996). "1996 Roofing Contractors – System Performance Information." , Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-02-5.
27. Kashiwagi, D. T., Anderson, J. P. and Al-Sharmani, Z. (1996). "Job Order Contracting Performance." Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-04–01.
28. Kashiwagi, D. T., and Halmrast, C. (1996). "CON 221 Engineering Mechanics – Statics." Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-08-4.
29. Kashiwagi, D. T., and Pandey, M. P. (1996). "Oversize Hail Resistance and Performance Analysis of Elastomeric Coated SPF Roof Systems." Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-11-4.

Book Chapters (9):

1. Kashiwagi, J. (2013) Kashiwagi, D.T. (2013)."Control and Influence." In Kashiwagi, Dean T. 2013 Information Measurement Theory, Chapter 9, pp. 9-1 - 9-6, Kashiwagi Solution Model, Mesa, AZ, ISBN: 978-0-9850496-3-8.
2. Kashiwagi, J. (2013) Kashiwagi, D.T. (2013)."ASU UTO Networking Best Value Case Study." In Kashiwagi, Dean T. 2013 Best Value Standard, Chapter 23, pp. 23-1 - 23-18, Kashiwagi Solution Model Inc., Mesa, AZ, ISBN: 978-0-9850496-2-1.
3. Kashiwagi, J. (2013) Kashiwagi, D.T. (2013)."ASU Data Center and Help Desk Project ." In Kashiwagi, Dean T. 2013 Best Value Standard, Chapter 24 , pp. 24-1 - 24-18, Kashiwagi Solution Model Inc., Mesa, AZ, ISBN: 978-0-9850496-2-1.
4. Morledge, R., Smith, A., Kashiwagi, D. (2006). "Building Procurement." RICS Research, Blackwall Publishing, ISBN-13: 978-0-632-06466-3.
5. Sullivan, K. (2008). "Creating a Structure for A/E Design Services that Minimizes Risk." In Kashiwagi, Dean T. Best Value Procurement, Chapter 9, pp. 9-1 – 9-16, Performance Based Studies Research Group, Tempe, Arizona, USA.

6. Sullivan, K. (2008). “Movement to “Best Value” Using the FAR.” In Kashiwagi, Dean T. Best Value Procurement, Chapter 11, pp. 11-1 – 11-19, Performance Based Studies Research Group, Tempe, Arizona, USA.
7. Sullivan, K. (2008). “Raytheon Missile Systems Case Study.” In Kashiwagi, Dean T. Best Value Procurement, Chapter 22, pp. 22-1 – 22-4, Performance Based Studies Research Group, Tempe, Arizona, USA.
8. Sullivan, K. (2008). “ASU Food Services Contract Case Study.” In Kashiwagi, Dean T. Best Value Procurement, Chapter 24, pp. 24-1 – 24-12, Performance Based Studies Research Group, Tempe, Arizona, USA.
9. Kashiwagi, J. (2008) Kashiwagi, D.T. (2008)."Who is On My Molecule." In Kashiwagi, Dean T. Best Value Procurement 3rd Edition, Chapter 6, pp. 6-1 - 6-6, Performance Based Studies Research Group, Tempe, AZ, ISBN: 1-889857-27-0.

Technical Reports (14):

1. Kashiwagi, J. (2012) Kashiwagi, D.T. (2012)."State of Oklahoma Case Study." In Kashiwagi, Dean T. Best Value Standard, Chapter 21, pp. 21-1 - 21-16, Kashiwagi Solution Model Inc., Mesa, AZ, ISBN: 978-0-9850496-0-7.
2. Kashiwagi, J. (2012) Kashiwagi, D.T. (2012)."Schering Plough Case Study ." In Kashiwagi, Dean T. Best Value Standard, Chapter 27, pp. 27-1 - 27-6, Kashiwagi Solution Model Inc., Mesa, AZ, ISBN: 978-0-9850496-0-7.
3. Sullivan, K. and Perrenoud, A. (2012). “Executive Succession Planning.” Electri International, Bethesda, Maryland.
4. Kashiwagi, J. (2011) Kashiwagi, D.T. (2011)."Large Government Organization (LGO) Case Study ." In Kashiwagi, Dean T. PIPS / PIRMS: Best Value Standard, Chapter 22, pp. 22-1 - 22-4, Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-32-9.
5. Kashiwagi, J. (2011) Kashiwagi, D. T. (2011). "New contract model." In Kashiwagi, Dean T. Information Technology Theory: A Revolutionary Approach to Project Management, Chapter 13, pp. 12-1 - 12-6, Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-31-2.
6. Kashiwagi, J. (2011) Kashiwagi, D.T. (2011)."Entergy, New Orleans, Louisiana Case Study ." In Kashiwagi, Dean T. PIPS / PIRMS: Best Value Standard, Chapter 20, pp. 20-1 - 18-4, Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-32-9.
7. Kashiwagi, J. (2010) Kashiwagi, D.T. (2010)."The Outsourcing of Arizona State University (ASU) IT Services." In Kashiwagi, Dean T. Best Value: Performance Information Procurement System (PIPS) and Performance Information Risk Management System (PIRMS), Chapter 22, pp. 22-1 - 22-8, Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-28-2.
8. Kashiwagi, J. (2010) Kashiwagi, D. T. (2010). "New Leadership Model of Alignment ." In Kashiwagi, Dean T. A Revolutionary Approach to Project Management and Risk Management, Chapter 8, pp. 8-1 - 8-22, Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-30-5.

9. Sullivan, K. and Ott, R. (2009). “Asbestos Regulations and Awareness Seminars Post Evaluation for EPA Requirements.” Environmental Information Association, Tempe, AZ.
10. Sullivan, K. (2009). “Client Decision Making: Raytheon Missile Systems and AZ State Parks Case Studies.” In Kashiwagi, Dean T. A Revolutionary Approach to Project Management and Risk Minimization, Chapter 23, pp. 23-1 – 23-6, Performance Based Studies Research Group, Tempe, Arizona, USA.
11. Kashiwagi, J. (2009) Kashiwagi, D. T. (2009). " United States Medical Command Case Study." In Kashiwagi, Dean T. A Revolutionary Approach to Project Management and Risk Minimization, Chapter 21, pp. 21-1 - 21-6, Performance Based Studies Research Group, Tempe, AZ, ISBN: 978-1-889857-17-6.
12. Egbu, C., Kashiwagi, D., Sullivan, K. and Carey, B. (2008). “Identification of the Use and Impact of Performance Information within the Construction Industry.” CIB Task Group 61 Summary Report, Amsterdam, Netherlands.
13. Hanna, A.S. and Sullivan, K.T. (2004). “Factors Affecting Labor Productivity for Electrical Contractors” National Electrical Contractors Association’s (NECA) Electrical Contracting Foundation, Bethesda, Maryland.
14. Hanna, A.S. and Sullivan, K.T. (2004). “Quantifying the Cumulative Impact of Change Orders [for Sheet Metal Contractors]” Sheet Metal and Air Conditioning Contractors’ National Association’s (SMACNA) New Horizons Foundation (NHF), Chantilly, Virginia.

APPENDIX I

AWARDS

The Performance Based Studies Research Group (PBSRG) has accomplished the following (PBSRG, 2014):

1. 2013 Top 5% Teaching Award, Arizona State University, Ira A. Fulton Schools of Engineering
2. IFMA 2013 Award of Excellence – Educator of the Year Award
3. 2012 IFMA Fellow, Distinguished Lifetime of Achievement, International Facility Management Association
4. 2012 Dutch Sourcing Awards – Best Overall Procurement Effort & Operational Excellence – Rijkswatersstaat
5. ASCE 2012 Leadership and Management in Engineering–Best Feature Article Award
6. Arizona Facilities Magazine – Most Influential People: Educator
7. Ira A. Fulton Schools of Engineering Top 5% of Faculty Award
8. 2011 IFMA Minneapolis/St Paul Chapter Facility Practitioner of the Year – ISD 287 FM Implementation of Best Value
9. 2011 George Cronin Silver Award for Procurement, State of Idaho Dept. of Admin. Div. of Purchasing, National Association of State Procurement Officials (NASPO)
10. 2009 Educator of the Year Award, International Facility Management Association Awards of Excellence
11. Ira A. Fulton School of Engineering Top 5% of Faculty Award
12. 2008-2009 Fulbright Scholar Award
13. 2008 Project Management Institute (PMI) Phoenix Chapter, Actively Encouraging Project Management Profession
14. 2008 CIB PC Commendation Outstanding Contribution from TG61 & W117 with the research and additional new members to CIB.
15. Ira A. Fulton School of Engineering Outstanding Teaching Award
16. Alliance for Construction Excellence (ACE) Highest Rated Instructor 2006-2008
17. 2007 COAA Gold Award, City of Peoria implementation of Best Value
18. 2007 FCM’s Station Style Gold Medal in Design, City of Peoria
19. 2007 Project Management Institute (PMI) Phoenix Chapter, Star Partner: Actively Supporting Project Management Profession, December
20. Alliance for Construction Excellence (ACE) Highest Rated Instructor
21. Alliance for Construction Excellence (ACE) Highest Rated Instructor 2006-2008
22. 2005 H. Bruce Russell Global Innovator’s Award, CoreNet Global, Corporate Real Estate Network Finalist, Harvard University, August
23. 2002 ASU Student Affairs Honors Academic Professional Recognition Award
24. 2002 AACE International Annual Meeting, One Presentation Rank 1st out of 92
25. 2002 AACE International Annual Meeting, Second Presentation Rank 8th out of 92
26. 2001 ASU Student Affairs Honors Academic Professional Recognition Award
27. 2001 Pono Technology Award, State of Hawaii

APPENDIX J

COURSES

Courses Taught (1992 – Present) (PBSRG, 2014):

- 220+ Classes Taught
- 10 New Courses Developed
- 3700+ Total Number of Students
- 4.7 Overall Instructor Average
- 4.6 Overall Course Average

New Courses Developed (10):

1. 2012 Spring, CON 598/494: FM Facilities Administration (3 credit hours)
2. 2011 Fall, CON 598/494: FM Building Energy Management (3 credit hours)
3. 2011 Spring, HON 394: Advanced Business Systems (3 credit hours)
4. 2011 Spring, HON 394: Deductive Logic Leadership and Management Techniques
5. 2010 Fall, CON 598/494: FM Operations and Maintenance (3 credit hours)
6. 2009 Spring, CON 294: Deductive Logic
7. 2008 Spring, CON 598: Project Management Methodologies (3 credit hours)
8. 2006 Spring, CON 501: Research Methods (3 credit hours)
9. 2006 Spring, CON 568: Facility Management Fundamentals (3 credit hours)
10. 2001 Sum, CON 598: Quantitative Analysis (for PhD program) (3 credit hours)

Year/Term Class #	Course Title	Students/Instructor/Course		
Spring 2014				
CON 221	Applied Statics	33	4.43	4.34
CON 294	Deductive Logic Leadership/Industry Structure	3	4.94	4.93
CON 294	Deductive Logic Leadership/Industry Structure	4	4.78	4.90
CON 294	Deductive Logic Leadership/Industry Structure	4	5.00	5.00
HON 394	Deductive Logic Leadership/Mngmnt Techniq.	26	4.76	4.43
HON 394	Deductive Logic Leadership/Mngmnt Techniq.	28	4.86	4.84
HON 394	Deductive Logic Leadership/Mngmnt Techniq.	27	4.55	4.59
CON 494	Information Measurement Theory I	5	4.94	4.71
HON 494	Information Measurement Theory I	25	4.94	4.71
CON 494	Advanced Procurement Systems	13	4.91	4.69
CON 496	Construction Contract Administration	35	4.71	4.81
CON 567	Advanced Procurement Systems	13	4.91	4.88
CON 567	Advanced Procurement Systems (on-line)	2	4.00	4.64
2013 Fall				
CON 221	Applied Statics	51	4.23	4.35
CON 294	Deductive Logic Leadership/Industry Structure	5	5.00	5.00
CON 294	Deductive Logic Leadership/Industry Structure	5	4.94	4.75
HON 394	Deductive Logic Leadership/Mngmnt Techniq.	24	4.94	4.95

		Students/Instructor/Course		
HON 394	Deductive Logic Leadership/Mngmnt Techniq.	28	4.91	4.93
HON 394	Deductive Logic Leadership/Mngmnt Techniq.	22	4.78	4.38
CON 494	Information Measurement Theory I	11	4.97	4.94
HON 494	Information Measurement Theory I	8	4.91	4.88
CON 496	Construction Contract Administration	38	4.57	4.50
CON 565	Information Measurement Theory I	11	4.89	4.74
CON 565	Information Measurement Theory I (on-line)	2	5.00	4.93
CON 565	Information Measurement Theory I (on-line)	2	5.00	4.00

2013 Spring

CON 221	Applied Statics	22	4.29	4.10
CON 294	Deductive Logic Leadership/Industry Structure	5	4.96	4.81
CON 294	Deductive Logic Leadership/Industry Structure	5	4.94	4.75
HON 394	Deductive Logic Leadership/Mgmt. Techniques	27	4.54	4.52
HON 394	Deductive Logic Leadership/Mgmt. Techniques	25	4.81	4.76
CON 494	Advanced Procurement Systems	23	4.96	4.99
CON 496	Construction Contract Administration	43	4.74	4.40
CON 567	Advanced Procurement Systems	7	4.67	4.74
CON 383	Construction Estimating	27		
CON 501	Research Methods	8		
CON 598	Project Management Methodologies I	4		

2012 Fall

CON 221	Applied Statics	34	4.60	4.72
CON 294	Deductive Logic Leadership /Industry Structure	8	4.95	5.00
CON 294	Deductive Logic Leadership/ Industry Structure	5	5.00	4.89
HON 394	Deductive Logic Leadership/Mgmt. Techniques	20	4.59	4.60
HON 394	Deductive Logic Leadership/Mgmt. Techniques	25	4.67	4.84
CON 494	Information Measurement Theory I	8	4.74	5.00
CON 496	Construction Contract Administration	35	4.57	4.75
CON 565	Information Measurement Theory I	10	4.95	4.93
CON 565	Information Measurement Theory I On-line	1	4.4	5.00
CON 598	Information Measurement Theory II On-line	2	5.00	5.00
CON 383	Construction Estimating	31		
CON 598	Project Management Methodologies I	1		

2012 Sum

CON 383	Construction Estimating	3		

		Students/Instructor/Course		
CON 501	Research Methods – Online	2		
CON 598	Project Management Methodologies I	3		

2012 Spring

CON 221	Applied Statics	24	4.48	4.51
CON 294	Deductive Logic Leadership/Industry Structure	11	4.95	4.96
HON 394	Deductive Logic Leadership/Mgmt. Techniques	22	4.79	4.70
CON 494	Advanced Procurement Systems	22	4.84	4.65
CON 496	Construction Contract Administration	40	4.52	4.36
CON 567	Advanced Procurement Systems	7	4.76	4.54
CON 567	Advanced Procurement Systems On-line	3	5.00	4.48
CON 383	Construction Estimating	35		
CON 494	FM Facilities Administration (New Course)	8		
CON 598	FM Facilities Administration (New Course)	2		
CON 598	Project Management Methodologies I - Online	6		
CON 598	Project Management Methodologies I	3		

2011 Fall

CON 221	Statics	35	4.89	4.72
CON 294	Deductive Logic Leadership/Industry Structure	7	4.96	4.71
HON 394	Deductive Logic Leadership/Mgmt. Techniques	15	4.99	4.97
CON 494	Advanced Procurement Systems	9	4.83	4.55
CON 496	Construction Contract Administration	43	4.74	4.61
CON 565	Information Measurement Theory (IMT) I	3	4.83	4.57
CON 565	IMT I On-line	3	4.83	4.21
CON 383	Construction Estimating	18		
CON 483	Advanced Building Estimating	33		
CON 494	FM Building Energy Management (New Course)	15		
CON 598	FM Building Energy Management (New Course)	9		

2011 Sum

CON 598	Quantitative Analysis (New Course)	5
CON 598	Research Methods	5
CON 598	Research Methods - Online	2

2011 Spring

CON 294	Deductive Logic Leadership/Industry Structure	12	5.00	5.00
HON 394	Deductive Logic Leadership/Mgmt. Techniques	20	4.98	5.00

		Students/Instructor/Course		
CON 494	Advanced Procurement Systems	7	4.96	4.83
CON 496	Construction Contract Administration	63	4.86	4.72
CON 567	Advanced Procurement Systems	6	3.44	3.61
CON 567	Advanced Procurement Systems On-line	5	4.92	4.89
CON 383	Construction Estimating	18		
CON 483	Advanced Building Estimating	21		
HON 394	Advanced Business Systems (New Course-Co-Inst)	10		
CON 598	Project Management Methodologies I - Online	3		
CON 598	Project Management Methodologies I	4		

2010 Fall

CON 294	Deductive Logic Leadership/Industry Structure	11	4.99	4.97
CON 494	Information Measurement Theory (IMT) I	5	5.0	4.75
CON 496	Construction Contract Administration	45	3.74	3.63
CON 496	Construction Contract Administration	7	4.70	4.86
CON 565	Information Measurement Theory (IMT) I	9	4.76	4.78
CON 565	IMT I On-Line	8	4.90	4.20
CON 383	Construction Estimating	37		
CON 483	Advanced Building Estimating	38		
CON 494	FM Operations & Maintenance (New Course)	17		
CON 598	FM Operations & Maintenance (New Course)	15		

2010 Spring

CON 294	Deductive Logic Leadership/Industry Structure	8	5.0	4.9
CON 494	Information Measurement Theory (IMT) I	5	4.0	3.7
CON 567	Advanced Procurement Systems	7	4.7	4.7
CON 598	Information Measurement Theory (IMT) II	3	4.7	4.6
CON 383	Construction Estimating	13		
CON 483	Advanced Building Estimating	42		
CON 598	Project Management Methodologies I - Online	2		
CON 598	Project Management Methodologies I	6		

2009 Fall

CON 221	Applied Statics	52	4.3	4.2
CON 294	Deductive Logic Leadership/Industry Structure	9	5.0	5.0
CON 494	Information Measurement Theory (IMT) I	6	5.0	4.8
CON 565	Information Measurement Theory (IMT) I	6	4.9	4.8
CON 565	IMT I (On-Line only)	4	4.8	5.0
CON 598	Information Measurement Theory (IMT) II	2	5.0	5.0

		Students/Instructor/Course		
CON 383	Construction Estimating	30		
CON 483	Advanced Building Estimating	41		
CON 563	Facility Management Fundamentals	9		

2009 Sum

CON 598 - Research Methods	18

2009 Spring

CON 294	Deductive Logic	2	5.0	5.0
CON 567	Advanced Procurement Systems	7	4.8	4.5
CON 383	Construction Estimating	40		
CON 483	Advanced Building Estimating	31		
CON 598	Project Management Methodologies I	6		

2008 Fall

CON 494	Performance Based Systems	2	4.6	4.3
CON 565	Performance Based Systems	9	4.9	4.8
CON 565	Performance Based Systems (on-line only)	2	4.8	4.5
CON 383	Construction Estimating	29		
CON 483	Advanced Building Estimating	39		
CON 598	Facility Management Fundamentals	12		

2008 Sum

CON 598 - Research Methods	16

2008 Spring

CON 494	Performance Based Systems	14	4.7	4.5
CON 567	Advanced Procurement Systems	11	4.9	4.7
CON 598	Information Measurement Theory (IMT) II	2	4.9	4.9
CON 383	Construction Estimating	28		
CON 483	Advanced Building Estimating	39		
CON 598	Project Management Methodologies I (NC)	14		

2007 Fall

CON 494	Performance Based Systems			
CON 565	Performance Based Systems	7	4.5	4.7

		Students/Instructor/Course		
CON 598	Information Measurement Theory (IMT) II	2	5.0	4.5
CON 383	Construction Estimating	43		
CON 483	Advanced Building Estimating	53		
CON 598	Research Methods	3		
2007 Sum				
CON 494	Graduate Leveling Course	9		
2007 Spring				
CON 494	Advanced Procurement Systems	23	4.6	4.2
CON 567	Advanced Procurement Systems	10	4.9	4.8
CON 383	Construction Estimating	28		
CON 483	Advanced Building Estimating	40		
CON 598	Research Methods	7		
CON 598	Facility Management Fundamentals	12		
2006 Fall				
CON 494	Performance Based Systems	20	4.8	4.6
CON 565	Performance Based Systems	10	4.9	4.7
CON 383	Construction Estimating	34		
CON 483	Advanced Building Estimating	34		
CON 598	Research Methods	8		
2006 Sum				
CON 494	Graduate Leveling Course	7		
2006 Spring				
CON 494	Advanced Procurement Systems	11	4.8	4.6
CON 567	Advanced Procurement Systems	12	4.8	4.6
CON 383	Construction Estimating	30		
CON 483	Advanced Building Estimating	40		
CON 598	Facility Management Fundamentals (NC)	13		
CON 598	Research Methods (NC)	17		
2005 Fall				
CON 494	Performance Based Systems	6	5.0	4.7
CON 565	Performance Based Systems	14	4.7	4.4

		Students/Instructor/Course		
CON 383	Construction Estimating	44		
CON 483	Advanced Building Estimating (Redesigned)	37		
2005 Sum				
CON 494	Graduate Leveling Course	12		
2005 Spring				
CON 494	Performance Based Systems	6	5.0	4.9
CON 567	Advanced Procurement Systems	9	4.6	4.7
CON 383	Construction Estimating	20		
ECE 100	Intro to Engineering Design	48		
2004 Fall				
CON 494	Performance Based Systems	4	4.8	4.8
CON 565	Performance Based Systems	2	4.7	4.0
IEE 494	Performance Based Systems	3	4.3	4.1
CON 383	Construction Estimating	33		
ECE 100	Intro to Engineering Design	44		
2004 Spring				
CON 494	Performance Based Systems	4	4.5	3.7
CON 567	Advanced Procurement Systems	3	3.7	3.4
IEE 494	Performance Based Systems	7	4.4	3.9
2003 Fall				
CON 565	Performance Based Systems	11	4.8	4.3
2003 Spring				
CON 567	Advanced Procurement Systems	8	4.3	4.0
IEE 598	Advanced Procurement Systems	11	4.3	3.9
2002 Fall				
CON 565	Performance Based Systems	8	4.8	4.2

2002 Spring		Students/Instructor/Course		
CON567A	Advanced Procurement Systems	6	4.9	4.8
2001 Fall				
CON565A	Performance Based Systems	8	5.0	4.9
2001 Spring				
CON567A	Advanced Procurement Systems	8	5.0	5.0
2000 Fall				
CON565A	Performance Based Systems	12	4.9	4.8
2000 Spring				
CON598B	Advanced Procurement Systems	13	4.7	4.7
1999 Fall				
CON221A	Applied Engineering Mechanics	41	4.0	3.6
CON221B	Applied Engineering Mechanics	17	4.8	4.4
CON598A	Advanced Procurement Systems	12	4.9	4.7
1999 Spring		Students/Course		
CON221A	Applied Engineering Mechanics	49	4.6	
CON598B	Advanced Procurement Systems	12	5.0	
1998 Fall				
CON221A	Applied Engineering Mechanics	42	4.2	
CON598A	Advanced Procurement Systems	11	5.0	
1998 Spring				
CON221A	Applied Engineering Mechanics	40	4.8	
CON598B	Advanced Procurement Systems	10	4.9	

1997 Fall Students/Course

CON221A	Applied Engineering Mechanics	42	4.8
CON598D	Advanced Procurement Systems	12	4.6

1997 Spring

CON221A	Applied Engineering Mechanics	31	4.8
CON598B	Advanced Procurement Systems	4	5.0

1996 Fall

CON221A	Applied Engineering Mechanics	42	4.1
CON598	Advanced Procurement Systems	4	5.0

1996 Spring

CON598E	Advanced Procurement Systems	5	5.0

1995 Fall

CON598C	Advanced Procurement Systems	19	4.8

1995 Spring Students/Course

CON598E	Advanced Procurement Systems	3	4.7

1994 Spring

CON221A	Applied Engineering Mechanics	26	4.6
CON251A	Microcomputer Applications for Constructors	44	3.6
CON294A	Elements of Engineering Design	4	5.0
CON494A	Advanced Procurement Systems	1	5.0
CON598C	Advanced Procurement Systems	3	4.7
CON598H	Advanced Procurement Systems	11	4.9
CON598J	Advanced Procurement Systems	6	5.0

1993 Fall

CON221A	Applied Engineering Mechanics	60	4.5
CON251A	Microcomputer Applications for Constructors51	4.2	
CON294C	Elements of Engineering Design	1	4.0
CON598D	Advanced Procurement Systems	13	4.5

1993 Spring

		Students/Course	
ECE106ZD	Intro to Computer-Aided Engineering	22	4.1
CON221A	Applied Engineering Mechanics	23	4.5
CON251A	Microcomputer Applications for Constructor25	4.0	
CON494A	Advanced Procurements Systems	4	5.0

1992 Fall

ECE106NG	Intro to Computer-Aided Engineering	41	4.3
ECE106NH	Intro to Computer-Aided Engineering	23	4.1
CON221A	Applied Engineering Mechanics	41	4.4
CON251A	Microcomputer Applications for Constructors	37	4.5

APPENDIX K

NEW ENTRY INTO COUNTRY/ORGANIZATION

The non-traditional research approach drives the new entrance into countries, organizations, or groups by the following (Ntshwene, 2010; Kashiwagi, 2011; Kashiwagi & Sullivan, 2013; PBSRG, 2014; Kashiwagi, 2014):

1. First, identify professional groups to brief the best value approach.
2. Identify visionaries willing to learn about best value concepts.
3. Identify a core team of PBSRG that can sustain initial success of implementation.
4. Once visionary is on board, set up a strategic plan and goals likely to be accomplished.
5. Identify multiple efforts, so implementation could continue if failure strikes one effort.
6. Continuously educate core team on best value.
7. Begin running best value tests with visionary.
8. Set up more presentations to all silo based professional groups and industries to brief them on successes of best value approach.
9. Continue to educate and make education available [online education, best value conference] for successful understanding of best value paradigm.
10. Show results of implementation.
11. Publish results in CIB W117 journal.
12. Continue to present results.
13. Attempt to change laws that keep countries from using the best value approach.
14. Continue to run tests and modify approach.

APPENDIX L

WEBSITE STRUCTURE

Purpose of Website

Dr. Dean and Dr. Sullivan identified in August 2014, PBSRG website's main function is to be a simple platform that delivers research and project transparency for both employees and research partners (PBSRG, 2014).

Vision for the Future

Dr. Dean identified the next 10 years as critical in proliferating the strategic plan of PBSRG, while engaging with the PBSRG website platform more often, being the critical component for displaying the marketing and education our research partners can benefit from. Dr. Dean identified the following (PBSRG, 2014):

1. If research partners use the best value approach correctly, they will have the ability to change vendor's practices without influencing or controlling them.
2. Using the best value approach correctly is to set up the structure that is non-technical, low risk, transparent, and minimizes decision-making.
3. Reach out to every industry partner and professional organization, and identify the above, using the website as a base they can utilize more often.

Obstacles for Website

The following was identified as obstacles for developing a simpler more transparent website (PBSRG, 2014):

1. Lack of transparency amongst main PBSRG presenters.
2. Derek, PBSRG website developer, is not receiving newest marketing and educational information from PBSRG's main presenters.
3. Main presenters are not setting up marketing campaigns, using student workers to reach out to local and national organizations to attend presentations.
4. Very few research clients have been generated from the use of the website, due to its lack of simplicity. The majority of clients come from hearing one of the main speakers present.
5. The website is structured to complex, and remains difficult for new comers to navigate and find critical information.
6. Matt, co-website developer/videographer, has been identified as a non-performer, due to his inactivity for over a year. Due to his inactivity and annual cost, PBSRG representative believe hiring 5 more web developers for the cost of Matt, would solve the complexity and lack of transparency issue on the website.
7. Dr. Dean believes he can salvage Matt's reputation, by identifying how he can be of more use and add value to the office.

The importance of website has been identified as a point of leverage, by first showing the number of presentations given in a year, and the number of cities traveled in.

APPENDIX M

STUDENT IMPACT

Since the creation of the Deductive Logic: Leadership and Management Techniques course in 2009, taught in Barrett, The Honors College at Arizona State University, PBSRG has documented 272 students out of 900 taught in the last six (6) years, who have identified impact. In total that is a little more than 30% of the course's total student population that documented how the concepts taught in the course has helped them in some form or fashion. The author collected the data from three separate sources (PBSRG, 2014):

- Student work
- RateMyProfessor.com
- Student Evaluations [DEWSC, and Barrett Honors College]

The author sifted through six (6) years' worth of student work, and identified any student work that showed impact to their personal life. Additionally, the author identified and documented all ratemyprofessor.com comments, and student evaluation comments that have identified personal impact. To date, the author has not seen any college courses that have documented student impact greater than 1% of their total population. It is the author's observation that the Deductive Logic course stands alone as a high performing course, due to its documented performance results. The results were the following (PBSRG, 2014):

Table 7: Documented Student Impact

Criteria	**Number of Students Impacted**
Student Work	103
Rate My Professor	104
College Student Evaluations	65
Total	**272**

Student Work

Example student testimonials were the following:

- "IMT helped me understand my family."
- "I have a better understanding of the future and past."
- "Used metrics to better measure their performance.'
- "Applied concepts on my internship."
- "Helped me understand my co-workers."
- "Helped me reduce stress."
- "Helped me become transparent."
- "Helped me overcome anger."
- "Helped me get off pharmaceuticals."
- "Helped me get free from alcoholism."
- "IMT helped me decide on my future career."

Class	Student Name	Type of Work
CON 294/HON 394 Fall 11	Marida Byrd	Paper 1
CON 294/HON 394 Fall 11	Kennya Rodriguez	Paper 1
CON 294/HON 394 Fall 11	Billy Smith	Final Presentation
CON 294/HON 394 Fall 11	Daniel Rollingher	Final Presentation
CON 294/HON 394 Fall 11	Jonathan LoFrisco	Final Presentation
CON 294/HON 394 Fall 11	Parker Thomas	Final Presentation
CON 294/HON 394 Fall 11	Zaw Naung	Final Presentation
CON 294/HON 394 Spring 12	Nisha Mohan	Paper 1
CON 294/HON 394 Spring 12	Erica Reyes	Final Presentation
CON 294/HON 394 Spring 12	Kelsey Dickerson	Final Presentation
CON 294/HON 394 Spring 12	Melissa Tran	Final Presentation
CON 294/HON 394 Spring 12	Wade Gyllenhaal	Final Presentation
CON 294/HON 394 Fall 12	Daniel Wilson	Paper 1
CON 294/HON 394 Fall 12	Jenna Makis	Paper 1
CON 294/HON 394 Fall 12	Jordan Benesh	Paper 1
CON 294/HON 394 Fall 12	Shelby Westmoreland	Paper 1
CON 294/HON 394 Fall 12	Ben Frelka	Paper 1
CON 294/HON 394 Fall 12	Kevin Monkelien	Final Presentation
CON 294/HON 394 Fall 12	Jenna Makis	Final Presentation
CON 294/HON 394 Fall 12	Kelsey Roderique	Final Presentation
CON 294/HON 394 Fall 12	Ben Asser	Final Presentation
CON 294/HON 394 Spring 12	Allyson Wright	Paper 1
CON 294/HON 394 Spring 12	Mathew Bankenbush	Paper 1
CON 294/HON 394 Spring 12	Matt Yoshida	Paper 2
CON 294/HON 394 Spring 12	Jeff Patterson	Paper 2
CON 294/HON 394 Spring 12	Thomas Wojtas	Paper 1
CON 294/HON 394 Spring 12	Kayla Byrd	Final Presentation
CON 294/HON 394 Fall 13	Lawson Williams	Paper 1
CON 294/HON 394 Fall 13	Jess Pfisthner	Paper 1
CON 294/HON 394 Fall 13	Jeff Clasen	Paper 1
CON 294/HON 394 Fall 13	Brittney Wallace	Paper 1
CON 294/HON 394 Fall 13	Ardesher Aghili	Paper 1
CON 294/HON 394 Fall 13	Amit Chauhan	Paper 1
CON 294/HON 394 Fall 13	Avery McKie	Paper 1
CON 294/HON 394 Fall 13	Paula Crawford	Paper 1
CON 294/HON 394 Fall 13	Marena Sampson	Paper 1
CON 294/HON 394 Fall 13	Connor Sonksen	Final Presentation
CON 294/HON 394 Fall 13	Ido Gilboa	Homework 2
CON 294/HON 394 Fall 13	Zack Zeigler	Homework 5
CON 294/HON 394 Fall 13	Erik Misiak	Homework 5
CON 294/HON 394 Fall 13	Michael Bradley	Paper 2
CON 294/HON 394 Fall 13	Devon Romo	Paper 2

CON 294/HON 394 Fall 13	Chris Neumann	Paper 2
CON 294/HON 394 Fall 13	Brandon Tallman	Paper 2
CON 294/HON 394 Fall 13	Branden Lau	Paper 2
CON 294/HON 394 Fall 13	Ashley Pelech	Homework 1
CON 294/HON 394 Fall 13	Alayna Terrell	Homework 2
CON 294/HON 394 Fall 13	Allison Baker	Homework 5
CON 294/HON 394 Fall 13	Renae Savala	Paper 1
CON 294/HON 394 Fall 13	Mounica Rao	Paper 1
CON 294/HON 394 Fall 13	Logan Mathesen	Paper 1
CON 294/HON 394 Fall 13	Alex Jurgenson	Paper 1
CON 294/HON 394 Fall 13	Scott Bohmke	Paper 1
CON 294/HON 394 Spring 14	Yagna Madala	Paper 1
CON 294/HON 394 Spring 14	Samantha Cooper	Paper 1
CON 294/HON 394 Spring 14	Sophia Robin Bucknell	Paper 1
CON 294/HON 394 Spring 14	Ryan Bartnett	Paper 1
CON 294/HON 394 Spring 14	Julie Andrews	Paper 1
CON 294/HON 394 Spring 14	Emma Hopson	Paper 1
CON 294/HON 394 Spring 14	Lexie Forkner	Paper 1
CON 294/HON 394 Spring 14	Alexander Enriquez	Paper 1
CON 294/HON 394 Spring 14	Carsten Ganske	Paper 1
CON 294/HON 394 Spring 14	Mathew Bankenbush	Paper 1
CON 294/HON 394 Spring 14	Alec Guthrie	Article 2
CON 294/HON 394 Spring 14	Shawn Root	Article 4
CON 294/HON 394 Spring 14	Keon Seif-Naraghi	Homework 1
CON 294/HON 394 Spring 14	Thomas Olsen	Homework 1
CON 294/HON 394 Spring 14	Heath	Homework 1
CON 294/HON 394 Spring 14	Francis Eusebio	Homework 1
CON 294/HON 394 Spring 14	John Ernzen	Homework 1
CON 294/494/ HON 394/494 Spring 14	Javier Gonsalez	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Amir Abolhassani	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Fabian Fink	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Sean Franklin	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Kyle Packer	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Megan Crepeau	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Andrew Sanchez	Final Presentation
CON 294/494/ HON 394/494	Mary Stefaniak	Final Presentation

Spring 14		
CON 294/494/ HON 394/494 Spring 14	Kayla Byrd	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Alayna Terrell	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Cody Kramer	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Matt Langford	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Harshavardhan Kilgnar	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Johnathan Meek	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Wessam Saleeb	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Shaunjit	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Anna Thurston	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Caroline Tao	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Alex Enriquez	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Andrew Quach	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Luke Roshon	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Karis Felthouse	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Ashur Rael	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Rikin Patel	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Basavanth Malladi	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Shih [Lydia] Chang	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Garrett Bently	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Thomas Olsen	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Laura Tichachek	Final Presentation
CON 294/494/ HON 394/494	Mason Sander	Final Presentation

Spring 14		
CON 294/494/ HON 394/494 Spring 14	D.J. Burton	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Courtland Jeffrey	Final Presentation
CON 294/494/ HON 394/494 Spring 14	Anthony Verlander	Final Presentation

RateMyProfessor.com

The two instructors documented are:

- Dr. Dean Kashiwagi – 77 positive responses
- Dr. Jacob Kashiwagi – 27 positive responses

Dr. Dean Kashiwagi		
Date	**Class**	**Student Comments**
5/5/2014	HON 394	The class was awesome! It changed my perspective on life. If you want to change and upgrade yourself, go ahead and take this course! It can definitely help and get what you want!
5/5/2014	HON 394	I wasn't sure what to expect from the class, but it turned out to be the most interesting class I've taken at ASU. Think applied philosophy. The class stresses the importance of seeing the big picture, and a lot of what you learn can help you reevaluate your life. A must take class from a great professor.
5/1/2014	CON 294	Probably the best class I have taken at ASU. The things you learned in this class can be applied to all other areas in your studies and life. The environment is fun, stress free, and relaxing, but it is also very engaging and thought provoking. I actually looked forward to going to this class!
4/29/2014	HON 394	Dr. Dean is an incredible teacher and leader. The concepts that are presented in this class are valuable for everyday practical use, regardless of your field of study. Take Dr. Dean if you are looking for an interesting and valuable class.
4/29/2014	HON 394	Best class I have taken at ASU by far! Dr. Dean is so intelligent and his class is so interesting and can apply to anything you do in life. This class changes your whole outlook on life!
4/29/2014	HON 394	Class was awesome, would recommend to anyone and everyone!

4/29/2014	HON 394	This class will blow your mind. I enjoyed coming to class every day and loved the topic. Your life will become less stressful once learning the concepts of IMT and you'll definitely want to take the continuation of the course. Plus it's an easy A as long as you go to class :)
4/29/2014	HON 394	One of the most enjoyable classes I haven taken in my entire collegiate career. Dr. Dean makes you really think about the world in a completely different light!
4/29/2014	HON 394	Great class with a fantastic teacher! It's easy, but it gets you to think!
4/29/2014	HON 394	This class is unlike any other you will take. It's applicable to a lot of other areas in your life.
4/29/2014	HON 494	A stellar professor who will redefine your definition of leadership and value. One of the ideas from this class is "work smarter, not harder," which means that while the class isn't difficult, the value of the information provided can be life-changing.
4/28/2014	HON 494	the raw value of is class makes it a must take!
4/28/2014	HON 494	One of the best professors at ASU, very knowledgeable, a true genius!! This class was truly amazing. It will enhance your learning strategies, and make you want to give your best wherever you are in life!
4/28/2014	HON 494	This class changed my thinking on life. Dean is a very inspirational individual and is very helpful with anything. I would highly recommend taking this class
4/28/2014	HON 494	I can listen to him talk allll day!
4/28/2014	HON 494	The class was very easy and required only a little bit of outside work but was fun and taught an interesting way of thinking.
4/28/2014	HON 394	The class teaches a different perspective to observe the world around you. It's a unique course, and one of the best I've taken at ASU. Highly recommend Dr. Kashiwagi--he cares about the students and bases the class on dominant examples and discussion.
4/28/2014	HON 394	Very interesting class with lively discussion and perspective shifting ideology. Recommend taking with an open mind, the goal of the class is really to decrease stress in all areas of life.
4/28/2014	HON 394	Dr. Dean teaches an enriching curriculum that can be applied to all assets of your life. Keep an open mind in this class and you will see how powerful the course is.

4/22/2014	HON 494	Dr. Dean teaches principles that can be applied to all parts of your life. The class has helped me learn about myself; it is truly life changing. If you want to learn to think and improve your understanding of yourself and the world then this class is right for you.
4/21/2014	HON 394	Dr. Dean is an excellent professor with clear expectations. The homework assignments for HON 394 could be better, but I always enjoyed attending class, because it was always a very well run and enriching experience.
4/9/2014	HON 394	Very interesting class. The material was neat and quite applicable. Minimal work required in order to best understand the material.
4/7/2014	HON 394	This class makes you think and is amazing! Highly recommended and super informative! I love Dr. Kashiwagi!
4/7/2014	HON 394	Dr. Kashiwagi's class was by far one of the most interesting classes I have taken at ASU. The class proposes many concepts that encourage students to think about themselves and the people around them in new ways. I would recommend this class to any ASU student.
12/26/2013	HON 394	One of the best professors I have had at ASU.
12/28/2013	HON 394	Dean will make you critically think how to see the world and made a positive impact in my life (less stress, more organized thoughts, etc). This class has really changed my perception in life!
12/16/2013	HON 494	This class and professor by far has had the greatest impact in my college experience. You will leave the class with a whole new way of thinking and a better understanding of yourself and your environment. I HIGHLY recommend taking this class.
12/12/2013	HON 394	One of the best courses I have taken at ASU.
12/11/2013	CON 484	Great class. the innovation presented is the direction that the world is moving toward. this class definitely prepares the student for a successful future in every major.
12/11/2013	CON 294	Dean Kashiwagi is a wonderful professor. He proposes great ideas and changes ones thought procedure without influence or control. He is unique in his thinking patterns. This class is a keeper and by far one of my best classes at ASU.
12/11/2013	HON 394	Really enjoyed this class! Definitely worth the time and Dean Kashiwagi proposes some interesting ideas that might change how you view things. Take it! One

		of my favorite courses at ASU!!
12/9/2013	HON 394	One of the best classes you can take as an Honors Student. Highly Recommended. This class will make all of your other classes easier and your stress levels become nonexistent.
12/9/2013	HON 394	Dr. Dean is a phenomenal speaker, teacher, and mentor. Class is interesting, stress free, and designed to change the way you think.
10/30/2013	HON 394	This class really makes you think about the bigger picture. It is a stress free class and everything is optional to some degree.
6/25/2013	HON 394	It was a very interesting class. A lot of thought provoking discussion. Dr. Dean was extremely helpful in helping us understand the concepts and you can tell he really cares about the students understanding. It was nice to see that he was more focused on us learning than keeping us busy with tests or assignments.
5/13/2013	HON 394	He is awesome! Dean does a great job making sure everyone understands his theory and really wants to help all his students. Every teacher should teach the way he does.
5/12/2013	HON 394	This class was mind blowing. I highly recommend it.
5/9/2013	HON 394	Dean is an amazing teacher and instructs an amazing class. He is very open-minded but works to challenge your perceptions whatever they may be. This course is an extremely enlightening experience that everyone should take if they get the chance.
5/6/2013	HON 394	learned a lot of great things and had a lot of fun. awesome class
5/5/2013	CON 294	Class really gets you to think!!! It can help you in every aspect of your life. It also is a fun learning environment that helps you to figure things out by yourself and to solidify your own views on life! I loved it! Best class ever!
4/30/2013	HON 394	Wow what a class. Just take this class. It's awesome.
4/30/2013	HON 394	This was, by far, the best class I've taken at ASU. Whether you agree with him or not, Dr. Dean's style of teaching encourages conversation and analysis. You learn from him and your peers, as well as better understand yourself. He is always open to questions and constructive criticism, and addresses everything logically. His office hours are awesome.
4/25/2013	HON 394	This was an amazing class. I took it to learn management but got so much more out of it. If you

		want an easy A take it. Class usually consists of an interesting discussion. Some people can't grasp the main message but it really changed how I look at things.
4/25/2013	HON 394	There aren't any other classes that I would say this about, but I think everyone should take this class. Regardless of your major or interest level, this class really makes you think. It's challenging in the sense that the concepts are very different, but the work load isn't very large. Always come to class, participate, and have an open mind.
4/24/2013	HON 394	Dr. Dean and group is very helpful and like everyone said: you will think differently about others and yourself after this class. I would take it as early as possible to help guide you through your years at ASU. Come to class, learn a lot, and no stress!
4/21/2013	HON 394	This class is amazing. This class will make you think in a way that you have never thought in before. Dr. Dean is and expert and is very helpful. I would recommend this class to anyone that wants to get a well-rounded college education. It's better to take this class early in your education, it will change your perspective on what you learn
4/20/2013	CON 294	This is the best class I've ever taken! HIGHLY RECOMMENDED to anyone who wants to know how to succeed in life. The class is very fun and challenges your mind to think in new ways. I would take it over! I will take the lessons learned with me and use them in my life. TAKE THIS CLASS! Dr. Dean really cares about each students' individual needs.
4/20/2013	HON 394	This class changed my life. There is not a lot of work outside of class. Dr. Dean has a unique and interesting outlook on life with some innovative ideas that help you learn to think and improve yourself as a person.
4/15/2013	HON 394	I LOVE THIS CLASS... Dr. Dean is a great guy, who really helps you think outside the box. It was refreshing to have a class that really made the student have to think and not just memorize data. Also, very easy.. you will get an A if you participate and try. FUN FUN I RECOMMEND!
4/15/2013	HON 394	This class made me have a completely new outlook on life. Everything you learn is very applicable to everyday life, and I highly recommend taking it! Dr. Dean is an amazing teacher and very helpful with

		teaching the concepts clearly. Not a lot of required work that you have to do, but this class has been one of the best I've ever taken!
4/15/2013	HON 394	This class was very abstract at first, because it is nothing like you've ever been taught, nor will ever be taught, in a real class. Very easy A if you come to class and do the biweekly assignment. Lots of movies and videos to compliment his message. Take the class, it really opened my eyes to something that can be applied to everyday life.
4/12/2013	HON 394	Professor Kashiwagi is an amazing professor. I can honestly say it is one of the few classes that I truly enjoyed in college. I feel every student should be required to take a class like this at least once.
12/18/2012	CON 394	This professor is awesome. He is very funny and genuinely cares about the students. He has changed the way I look at life. He makes complex subjects very simple and dominant. I think everyone should be exposed to this guy.
5/9/2012	CON 494	This class is perfect for everyone. If you are looking to learn a system & practices that you can practically apply to any & all areas of life, you will. If you are looking for an easy class that is also enjoyable, you will find it here.
5/1/2012	CON 494	Excellent professor. I recommend that everyone take at least one class with Dr. Dean it may change your life. If nothing else he presents logical ideas that get the brain thinking and isn't that why we are in school? Take a class with Dr. Dean and you will not be disappointed.
4/27/2012	CON 567	Great teacher. Creates an environment for students to learn and grow.
4/24/2012	CON 494	Best class I've taken in college. Dr. Dean is a tremendous teacher and is enjoyable to listen to. Lessons learned in this class can be applied to business and life in general. I thoroughly enjoyed attending this class. Highly recommend!
4/22/2012	HON 394	I took this course on a whim and am very glad I did. Dean challenged the way I think and approach life. This course was likely the most useful course in my college career.
4/14/2012	HON 394	Take this course, because you will absolutely learn something about yourself. Additionally, Dr. Kashiwagi is a lot like Mr. Miyagi, and lets you watch good movies.

4/13/2012	HON 394	This class is an adventure. For every hour you spend talking about the lessons in class you will spend five thinking about and applying those lessons outside of class. It has the potential to completely change your life so drastically, a hundred years of life experience wouldn't be enough to match.
1/10/2012	CON 294	Dean is a wonderful person and such a curious human being. He thinks about a lot of things and knows so much information. Ah this is going to be a cheesy review, but I have the highest opinion of Dean. Apply what he says to your life. Make an effort to listen and participate, visit his office, and get to know Jacob as well. Take this class :)
12/17/2011	HON 394	If you want to make a change in your life, to understand & master yourself, this class is one and only class for you. You may not realize how blind you're until you take this class. Truly amazing! My thinking, the way I perceive information, and my vision have been significantly improved. You will never find such class anywhere. So take the chance!
10/26/2011	HON 394	Life changing to say the least!!!!! Dr. Kashiwagi is an amazing, and dominant teacher, best I have had in any course. Every student should be required to take this course. Mind opening, thought provoking, soul searching, and downright fun. 3 insightful and easy papers, midterm, and final. TAKE THIS COURSE!!!! Loved this class!!!!!!!!!!!
10/25/2011	HON 394	Be prepared to think
10/25/2011	HON 394	Wonderful class, Dr. Dean is an amazing person to learn from. He offers an interesting and important view on business management that is applicable in all areas of life. Some things that are discussed may be hard to swallow, but you can find ways to apply the philosophy to your life. You won't need to worry about grades at all in this class.
10/24/2011	CON 294	For anyone who is interested in leadership principles, making things more efficient, and working smarter, this is the class for you. It shows you how to align resources and people to produce the most optimal outputs. Not only that, but it teaches you to identify who people and companies are with minimal amount of information. Best Class ever!
10/14/2011	HON 394	Hands down--the best professor I've ever had. If you take this class from the right perspective it can alter the way you perceive life. I would not trade the

		experience from this class for anything!
5/11/2011	HON 394	This class was extremely interesting and beneficial to my learning experience. Any honors student that wants to learn how to work smart should take this course! Do yourself a favor - and your GPA ;)
4/27/2011	HON 394	One of the best courses I've taken in ASU
4/25/2011	HON 394	A truly brilliant professor whose class you will not forget. If you prefer working smart to working hard, this is the class for you.
4/22/2011	CON 294	I will claim that this was the best class I took through college for my entire life. No jokes. If you want an easy A does not waste Dr. Dean's time but if you really want to learn then take this class.
4/19/2011	HON 394	Dean is one of the best professors at ASU. He explains things in the easiest way possible, and he frames things in a whole new way. The things you can pick up from his class will help you in all aspects of your life!
4/18/2011	CON 294	This is the funniest class! Dean is awesome. The material is very interesting and makes you think about everything in a whole new way! I am taking him again next semester. Don't miss out on this professor!
4/8/2011	CON 294	Great Teacher!!! He has an interesting view on life and self-betterment, and it is always a joy attending the course!!! VERY HIGHLY RECOMMENDED!!!!!
4/5/2011	CON 294	Amazing teacher, he will always help you whenever you need it. He will make sure that all of his students "see". The topic of the class is far more interesting than any other classes. The best class so far.
4/4/2011	CON 294	Awesome teacher and awesome class. Teaches you what you need to know only. One word "Dominant"
5/13/2010	CON 494	He is a great teacher. Believes in doing less but increasing returns. He is always there for the students. He gave me every chance to get an A. No reason a person shouldn't get an A if they go in for help. He is clear and simple. His material and curriculum was interesting and fun. This class should be required for everyone...even professors!
Total Positive Responses:		**77**

Dr. Jacob Kashiwagi		
Date	**Class**	**Student Comments**
5/5/2014	HON 394	Seriously great class. Low stress, high levels of learning. His lectures were delivered more clearly than his father, Dean.
5/1/2014	CON 294	Jacob is an outstanding teacher! I have learned more from this class than any other class I have taken at ASU! Take this class if you want to have a positive life changing experience!
4/29/2014	HON 394	Jacob is a great teacher and truly knows how to reach students. He is very laid back and wants to relay this low-stress philosophy to all students. If you take this class, you will have fun and learn quite a bit at the same time.
4/28/2014	HON 494	This class will teach you how to analyze your own life. Throughout this class you will open your mind to a new way of thinking called IMT. I highly recommend this class
4/28/2014	HON 494	I love this class and him so much and I want to take it again and have him as a professor again and he is so cool.
4/28/2014	HON 494	Class was very easy and fun. Did not require very much outside work. This class was interesting and taught a different style of thinking
4/22/2014	CON 294	The principles that you learn in this class can be applied for the rest of your life. It is a life changing class that will truly expand your way of thinking and viewing the world around you. As Dr. Kashiwagi says, "You can know everything, without knowing anything." You won't regret taking this class! Jacob you rock!
4/7/2014	HON 394	This class makes you think and is amazing! Highly recommended and super informative! I love Jacob!
12/16/2013	HON 494	Jacob is extremely smart, caring , funny, and very perceptive. The knowledge gained from this class is unbelievably valuable. You will leave this class with a whole new way of thinking. After taking the course you will understand yourself and your environment much better. I HIGHLY recommend this class.

12/11/2013	CON 494	Awesome professor and great class. topics covered are essential to all students entering their profession and the principals can be used in both work and personal life. definitely a winner.
10/21/2013	HON 394	This class is life changing. 10/10 would take again.
5/13/2013	HON 394	Jacob is a great teacher! He really looks to help his students. Definitely one of the best professors at ASU.
4/25/2013	HON 394	Jacob is a great professor. Always willing to go the extra mile to help. Maintains a very no-stress mentality and is easy to talk to.
4/20/2013	CON 294	AMAZING CLASS! I recommend to everyone. He teaches you how to think in ways you've never thought before. So enlightening and interesting!!!
5/19/2012	CON 494	This class is perfect for everyone. If you are looking to learn a system & practices that you can practically apply to any & all areas of life, you will. If you are looking for an easy class that is also enjoyable, you will find it here.
4/27/2012	CON 567	Jacob is a great teacher with a great personality.
4/25/2012	CON 494	Jacob is an excellent teacher and a great guy. He is easy going, positive, and enjoyable to listen to. I highly recommend taking any course from Dean or Jacob Kashiwagi.
12/17/2011	HON 394	Jacob is very smart, sweet and nice. He is so helpful and encouraging. Easy A, yet learn so much. Every single class improves your thinking. The best class, best environment, best instructors!!! You will have them all in this class.
10/26/2011	HON 394	Like father like son. Amazing professor. Dominant, witty, energetic, funny, brilliant, and caring. Best course I have ever taken by far. I look at life from a whole new perspective now. Paper is simple and relevant, tests are rather tough(but they do not matter :))l Suit up, show up, and be prepared to change your life. TAKE THIS CLASS!!!!!!!!!!
10/24/2011	HON 394	Jacob is one of the smartest instructors out there. He is young and looks like he is 21, but is

		much older and wiser. I would say he has more industry experience than 80% of the professors at ASU and smarter than 90%. After hearing him present, you will know what I mean. I would recommend anyone to talk or hear him speak if they have the chance!
4/27/2011	CON 294	Jacob is so energetic on the subject he is teaching. He can understand where students have trouble understand. Very nice teacher.
4/22/2011	CON 294	Jacob is super chill and very easy to understand because he explains things so well. I highly recommend this class.
4/19/2011	HON 394	Jacob is really easy going but you learn a lot from him if you choose to learn. I always went to class not because it was required but because I enjoyed it so much. Take anything he's teaching, you won't be disappointed.
4/18/2011	CON 294	Awesome teacher! He is funny and always makes you feel like you have great potential. He guides you through asking questions that are simple and easy to understand. You will have a lot of "ah ha" moments. Take his class, it is worth it.
4/8/2011	CON 294	Great Teacher!!! He has an interesting view on life and self-betterment, and it is always a joy attending the course!!! VERY HIGHLY RECOMMENDED!!!!!
11/3/2010	CON 294	He is such a great teacher and explains everything so clearly! This class was extremely useful in application to my life and was extremely interesting. I think that everyone in my class was surprised by the information and its usefulness to improve everyday life.
5/13/2010	CON 294	He is a great teacher. I have never seen someone so passionate and simple minded. He has the ability to explain things in a way that even a complete imbecile can understand. He truly believes what he teaches and is helpful in every way he can. His material is intriguing and thought provoking!!! Highly recommend!!!!
Total Positive Responses:		**27**

College Student Evaluations

Date	Class	Student Comments
Fall 2012	CON 294	"I liked every concept the instructor taught us. This man has lived success and truly wants his students to succeed. The lessons he teaches are invaluable. I could not have asked for any more from a course."
Fall 2012	CON 294	"This was a very brain stimulating class. Every class I went in and walked out with a lot of interesting thoughts and during the class, any question I asked was answered in a way to promote thinking."
Fall 2012	CON 294	"I'm so glad I took this course. It'll help me pursue leadership over management."
Fall 2012	CON 294	"The class was very intellectually stimulating and had engaging content. I feel more prepared for my future after graduation than before. Class content can be applied not only to future career, but everyday life in general. The instructor and all the class aides are phenomenal."
Fall 2012	CON 294	"Dean Kashiwagi has changed the way I see the world and how I live my life. I have never had a better instructor. I will remember this man till the day I die."
Fall 2012	CON 294	"This was truly one of the greatest classes I have ever taken at ASU. This class was a breath of fresh air and I can honestly say I learned more about myself in this one class than I have at the rest of my ASU experience. Whatever kashiwagi is doing, keep it up. I have recommended this class to a lot of my friends but it unfortunately filled up within minutes of being open. (No surprise)"
Fall 2012	HON 394	"Relaxed, fun learning environment, a break from the traditional types of classes. Very good discussion at times. The TA's were great."
Fall 2012	HON 394	"I loved learning Kashiwagi's perspective and being able to openly engage in discussion throughout the semester. The professor doesn't force his ideas and beliefs down your throat rather asks you to step back, evaluate his, and decide on your own."
Fall 2012	HON 394	"IMT and KSM have totally changed my outlook on things!"
Fall 2012	HON 394	"It gave me an ability to really think. I was challenged in thinking and never thought about things this way. This class has really changed my perception."

Fall 2012	HON 394	"This course caused me to think in a way that I have never been taught in a structured classroom."
Fall 2012	HON 394	"How different it is from any other college class. It makes sense, I learned more than I have from most other classes, and it didn't add to my stress levels hardly at all. This should be the ideal form of a college course!"
Fall 2012	HON 394	"It forced me to think critically and abstractly."
Fall 2012	HON 394	"Engaging material that made you see the world differently."
Fall 2012	HON 394	"The course stimulated me to think in a way that I had not thought about before. Dr. Kashiwagi's approach to teaching encouraged students to do their best for the sake of their own learning and not a grade."
Fall 2012	HON 394	"I really liked the structure of the course and the information and ideas presented in class. They provided me with things to think about and to discuss both with members of the class and with people not in the class."
Fall 2012	HON 394	"The professor and his assistants are outstanding. The theory they present is so interesting and really makes students think and analyze life. I loved this class."
Fall 2012	HON 394	"The fact that for once I wasn't just regurgitating information onto a multiple choice test. Dr. Dean understands what students are going through and truly wants to help. It's a sad fact that I've had 25+ teachers over four years, yet only Dr. Dean actually wanted to be there to teach and enrich our lives."
Fall 2012	HON 394	"Best class I've taken this whole year!"
Fall 2012	HON 394	"IMT needs to be presented to the dean of W.P. Carey."
Fall 2012	HON 394	"This was a class I really enjoyed, and will be recommending to any friends looking for a class to take!"
Fall 2012	HON 394	"This is the best class that I have taken at ASU. Dr. Kashiwagi is an incredible teacher who clearly loves not only what he teaches but the actual function of teaching as well. I have grown so much as a person from the beginning of this class to the end. I wish it was not over!"
Fall 2012	HON 394	"Best teacher I've ever had. I honestly wish more teachers were like him at ASU."
Fall	CON	"This class stimulated my mind."

2012	494	
Fall 2012	CON 565	“We had to think outside the box.”
Fall 2012	CON 565	"Expect the unexpected. Totally new concept. Amazing course.”
Fall 2012	CON 565	“A completely new concept was introduced. Found it amazingly accurate in all walks of life.”
Fall 2012	CON 565	“Interesting class, new way of thinking and looking at things from a different angle.”
Fall 2012	CON 565	“A great course taught by a great visionary. It was a pleasure to be a part of this class. Changed my way of thinking for the better. I would recommend this course to every student who comes to ASU. Great (BEST) value course! Do not miss this wonderful experience of learning.”
Spring 2013	CON 294	“I love the new ideas presented and the way the course is carried out. Very different from any other courses I haven to and definitely the most helpful one ever.”
Spring 2013	CON 294	“I loved the critical thinking it taught me to use! It was very interesting and I was always excited to go to class, unlike many of my others. Wonderful experience!”
Spring 2013	CON 294	“In most classes you don’t get anything that you can apply into your life but in this class everything is applicable to right now! It is interactive, so you get to know more people and to have fun!”
Spring 2013	CON 294	“This course content is always on my mind. I put very few hours down for question 20 because my time spent thinking about the subject to me was far different from formal studying. The ideas and concepts in this class are so applicable in every aspect of my daily life that I reflect on them continually throughout the day in an enjoyable manner.”
Spring 2013	CON 294	“I think everyone should be required to take this course or at least attend a presentation regarding what is thought; be it students or staff.”
Spring 2013	CON 294	“Phenomenal class; I recommend it to all! I have learned things that have really helped me in life in general.”
Spring 2013	CON 294	“This is the one class I recommend to my friends, no matter what their major may be. The principles taught in this class are so universal it does not matter what field you are going into, they will help you. Note: this class is not for everyone.”
Spring	HON	“It is unlike any course I have ever taken.”

2013	394	
Spring 2013	HON 394	“The information taught was practical and could be applied to my field of study.”
Spring 2013	HON 394	“It presents a new way of looking at the inter-workings of life.”
Spring 2013	HON 394	“How much of this course I have been able to apply to my life.”
Spring 2013	HON 394	“I enjoyed the thought provoking material. Dean Kashiwagi has a unique style of teaching that allows students to actually learn in class instead of worrying about scores on homework or exams.”
Spring 2013	HON 394	“Excellent class. Structured in a way to encourage critical thinking in a low stress environment.”
Spring 2013	HON 394	“Amazing material. I felt like I was actually using my mind and thoughts, rather than the typical memorization for exam class. I loved the material taught in this course.”
Spring 2013	HON 394	“This class challenged traditional thinking. It forced students to look at things with a very different perspective. Dr. Kashiwagi was always engaging each of us in order to make sure we all understood the course material. It was a class filled with challenging concepts but it was made to be very enjoyable.”
Spring 2013	HON 394	“I liked that the professor was not afraid to challenge students to think critically about many different issues. The theories were radical, but they made sense and they are directly applicable to real-world issues.”
Spring 2013	HON 394	"Concepts learned in the lectures were related to a wide variety of applications, from movies to supply chain to daily interactions.”
Spring 2013	HON 394	“To say the class way eye-opening would be an understatement. Definitely have a whole new perspective on life after taking this class; taught so much that is applicable to everyday things. This class should be the capstone for any graduating student.”
Spring 2013	HON 394	“It was an incredibly stimulating class. It managed to get everyone to participate and contribute to the class on a regular basis. This was a fantastic class.”
Spring 2013	HON 394	“Dr. Kashiwagi has a way of communicating very abstract and complicated ideas in a very simple, dominant manner. He can deliver his lectures in a way that facilitates learning while still making them enjoyable.”

Spring 2013	HON 394	"Interactive, dynamic classes and discussion; course content is applicable to any field of work/study."
Spring 2013	HON 394	"I advise everyone to take this class."
Spring 2013	HON 394	"I loved this class. It is, by far, the best class I have taken at ASU."
Spring 2013	HON 394	"This class was one of the most unique and interesting classes I have taken at ASU. I'm not sure I agree with everything the professors taught, but I would still recommend the course as I think there is definite value to their teaching style."
Spring 2013	HON 394	"The knowledge gained is applicable in every situation and I will be forever grateful for Dr. Dean Kashiwagi's contribution to the students of Arizona State University."
Spring 2013	HON 394	"By far one of the greatest courses I've taken at ASU. I feel like I learned more in this class than I do in most others, and it was done in a highly efficient and organized way. I wish I could take more like it."
Spring 2013	HON 394	"Hands-down the most practically applicable course of my entire undergraduate career."
Spring 2013	CON 494	"Challenged students to think. Changed the way we think about life. Provided us with a new way of tackling problems."
Spring 2013	CON 494	"What I really enjoyed about this class was that the material being taught could be applied not only to my field of study but to life in general. I would recommend this class to anyone."
Spring 2013	CON 494	"I learned so much from Dr. Dean, everything he said can be, and I will, apply in my life. One of the top professors in ASU."
Spring 2013	CON 494	"This course opened my mind to so many things. It helped me see the big picture."
Spring 2013	CON 494	"I regret not taking classes with Dr. Dean up till my last year at ASU. Amazing professor.
Spring 2013	CON 494	"This is one of the class that I really like in ASU."
Spring 2013	CON 494	"I really like this class and I strongly recommend it to others."
Spring 2013	CON 567	"Learn how to think. Very good for those who want to be expert in contract system."
Spring 2013	CON 567	"A must enroll class."