The Research Model that Revolutionized the Dutch Construction Industry

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The Dutch construction industry is making a change from an owner controlled to a contractor-controlled environment. It is a movement from a top down culture (management, direction and control) to a bottom up culture (alignment and use of expertise). Owner decision making, management, direction and control are being replaced with a leadership model, which aligns and utilizes the expertise of the contractors. The changes in the Dutch construction industry validate a non-traditional research model, which used deductive logic and case studies involving dominant information and visionary industry participants, non-traditional concepts of Information Measurement Theory (IMT), the Construction Industry Structure (CIS) model and the best value Performance Information Procurement System (PIPS).

Keywords: best value, construction, Dutch construction industry transformation, leadership based supply chain

Introduction

In the early 2000s, the Dutch construction industry experienced industry collusion. The majority of general contractors, subcontractors, and material suppliers were found to be participating in the price collusion on Dutch construction projects (Doree 2004, Kashiwagi 2011, van de Rijt et al. 2009, Wearden 2008). What made this collusion interesting was the low rate of contractor profit margin (less than 4%). The initial attempt to fine the guilty parties based on their turnover, made way to identifying the guiltiest offenders and using the information from the confessed participants to convict a few offenders. It resulted in an environment of confusion and fear. The industry did not have an understanding of the cause and solution of the collusion (Ang 2011).

A visionary in the Dutch government, George Ang from the Ministry of Housing, identified a potential solution to the collusion problems. Ang was exposed to the best value approach, industry structure and a potential solution at various international conferences (2011). The solution included explanations using the Construction Industry Structure model (CIS) and the Best Value (BV) explanation from Arizona State University, which explained that the problem was not caused by the colluding vendors but actually by the owners' management, direction and control of the contractors (Ang 2011, Kashiwagi 1991). The difference with the (BV) explanation and other explanations was (Kashiwagi 2012, Santema 2011):

1. The simplicity and clarity of the explanation.
2. The solution was not a technical construction industry solution, but a supply chain solution.

3. The solution had been tested hundreds of times with dominant results (awards, time and cost savings and increased vendor profits).
4. The industry structure model explanation matched the observations of the Dutch construction collusion environment and results.
5. It was the only solution that proposed a "win-win" result, lower project cost and higher construction contractor profit.

Preliminary test results of the BV system solution from the United States included (PBSRG 2012):

1. 98% customer satisfaction, on time, on budget.
2. Vendors increased their profit as much as 100%.
3. PIPS system could reduce government transactions as much as 90%.

What made the Dutch case study unique was the reason why Ang (2011) sought out an American academic researcher's, Dr. Dean Kashiwagi, solution to solve the Dutch industry problem. The American researcher had a simple explanation, test results and dominant proof. Kashiwagi combined logic, simplicity, and repeated dominant test results to support his solution. No other proposers were ready to implement. The PBSRG was using an unconventional research model and approach. Kashiwagi's expertise was derived from simultaneous conceptual design, immediate industry testing, modification of the design solution and immediate retesting/implementation (components of the scientific method). The staggering amount of repeated industry testing, the dominance of the test results, and the simplicity of the explanation was convincing enough to "gain the attention" of Ang. Kashiwagi proposed that the solution not only theoretically explained the Dutch contractor collusion, but would also correct the problem. Ang brought Kashiwagi and the PBSRG to meet leaders from the Dutch government agencies in 2004 (Ang 2011).

Performance Based Studies Research Group (PBSRG)

The Performance Based Studies Research Group (PBSRG) was started by Kashiwagi in 1991. PBSRG was unique in the following ways:

1. It proposed that the solution to the construction industry problems of non-performance could be quickly identified, using simple explanations, which could be easily tested.
2. The simplicity of the solution challenged the more complex traditional construction management approaches of the past 20 years. PBSRG identified that traditional risk and project management by the owner increased risk and lowered performance instead of decreasing it. It proposed that owner management, direction and control cannot be utilized to increase construction industry performance. It differentiated the terms of "management, direction and control" with the term "quality control" (conducted by the expert vendor). One increased risk, one decreased risk.
3. PBSRG did not seek or receive any traditional government research funding. Government research funding was primarily given to researchers whose research was aligned to the traditional research approaches. To get government research funding, one had to believe in the traditional research methodologies and participate in the

traditional and popular research approaches and activities. All funding received was operational funding from "visionary" industry owners (visionary is defined by authors as participants who understood the BV concepts and followed exactly the proposed BV approach, oftentimes allowing the authors to test the BV concepts in totality) who used their own operational funding to more efficiently accomplish the operational requirements of organizations. PBSRG was able to do their research without catering to any constituents or previous ideas in the construction industry. PBSRG proposed if the government research funding had been utilized properly; the construction industry would not be in the dire status it found itself in. This approach was viewed as aggressive and polarizing.

4. PBSRG had control over the majority of tests that were run. PBSRG only ran research tests with visionaries. PBSRG identified the majority of industry personnel as "blind" and the reason for the industry problems. Visionary research industry partners allowed the PBSRG researchers to control the tests due to dominant past performance of the researchers' tests.
5. A deductive approach to research was utilized. It identified concepts based on simple observations. It did not depend on industry consensus and support, assuming that the industry was tainted by their incorrect practices and personal agendas. It assumed the answer would not come from the industry, which was causing the problem, nor would they have agreement of the majority of the industry.
6. The research ideas and solutions would come from outside of the traditional construction management research area. Ideas would have to be easily correlated to observations of case studies, logic and common sense. If the results were not dominant, it would not have had any value. Dominant is defined as something so simple that it would attract the industry visionary. The solution had to overcome the bias against change that their traditions, culture, and personal experiences.
7. PBSRG realized that this approach would receive stiff resistance from traditionalists, peers and industry participants. To find the solution, PBSRG realized that it would have to get into the "rice bowl" of many researchers. PBSRG assumed that most industry researchers and practitioners were "blind," reactive, and silo based personnel who were not capable of understanding major sources or solutions to the industry problems. Logically, the problems would not exist if they were visionaries.
8. By observation, most researchers were not industry experts, but academic professionals (Muatjetjeja et. al. 2009). Their main objective was to gain academic positions, and not to be a career researcher and industry expert. These individuals were not who had to be convinced, it was the industry practitioner visionaries who were actually going to implement the solutions that needed convincing.
9. To overcome the more complex traditional approaches and to find the visionary, the solution would have to be simply stated, easy to explain, testable, and re-testable over a short period of time. Although the application would be embellished and improved, the foundation tenants had to have characteristics of recursion. The foundation tenants would explain the solution to a myriad of problems that were occurring.
10. It was also determined that in order to be sustainable, a totally new research model would have to be created where visionary industry and academic researchers could work hand in hand.

The PBSRG model was to observe, identify the solution, find the visionary, test the concepts with the visionary, and document. Traditional research concerns such as type of funding, prestige of funding source, complete literature search, peer review and tying into existing traditional thought were bypassed. PBSRG did not value what others were doing if it didn't lead to dominant results.

The New Research Model

The research model was simple. Find a dominant solution through observation. Expose the solution to the industry through many educational presentations. Find the industry visionaries (client/owner, contractor, or other participants in the supply chain) who understood the revolutionary foundation concepts. Run tests with the visionaries. Document the results of the tests. Find more visionaries and run more tests. Document the tests. Sustain the iterative process. Using Patton's military maneuver of bypassing any resistance and returning later and crushing the resistance from the rear, the new research model used dominant test results, which would overwhelm the silo resistance of traditional industry thinkers. This required the researcher to have simultaneous theoretical conceptual research, prototype testing and implementation research at the same time. The margin of error has to be minimized, because the research funding is not government research funds, but operational funds of organizations, which cannot be wasted. If the concepts were correct, the research would flourish. If the concepts were wrong, the funding would be terminated. The new research model would require:

1. Robust, conceptual models that were simple and accurate.
2. Presentation to identify visionaries.
3. Industry funding by visionaries who would give control of the research testing to the researchers.
4. Repeated testing.
5. Use of the research funding to resolve issues in the entire research program, i.e. teaching concepts, conceptual research, identifying new environments where the concepts could be tested, and research tests.
6. Visionary research participants who would pool their resources and opportunities. The team would include research visionaries who funded the effort, research visionaries who help test the concepts and gain access to more visionaries but did not necessarily provide any research funding and support staff that multitask to allow the researchers to maximize their time to do the research.
7. Research experts would be researchers' first, and academic professionals, and administrators second. The strength of the research program would be the professional researchers and not graduate students. Graduate students would augment the work of the expert professional researchers.

Research Technology

The foundational components of the proposed solution were the Information Measurement Theory (IMT), Kashiwagi Solution Model (KSM), Industry Structure (IS) model and the Best Value (BV) Performance Information Procurement System (PIPS), or the Performance Information Risk Management System (PIRMS). IMT, KSM, Construction Industry Structure

(CIS) model, which is also known as the Industry Structure (IS) model were created in 1991 – 1994 (Kashiwagi 1991). The concepts were documented, copyrighted, and licensed by Arizona Tech (also known as AZ TECH, the licensing group of Arizona State University). IMT and KSM were developed in the Kashiwagi family and copyrighted (1976-present) (Kashiwagi 2011). Basic tenants of IMT included:

1. Only one outcome. Event outcomes are dictated by the event's initial conditions and natural laws that explain the change from one condition to another and which can be used to predict the event's outcome.
2. No chance element. There are no elements of chance or randomness.
3. Predictability. Every person and condition is predictable with sufficient information.
4. The expert has no risk, as risk is defined as when the outcome does not match the expectation. The expert can always see into the future and therefore knows what will happen before it happens. Experts predict, not expect.
5. No control. Practice of control increases risk. One party does not have any effective influence or control over another party. Any use or intent or dependence of a mechanism to control another party to mitigate one's risk increases the risk. Any use of a contract to enforce the buyer's expectation on a vendor would increase risk and cost.
6. Risk management increases risk. The use of project and risk management by one party who is not an expert to minimize the risk caused by another party increases the risk. Rather than have risk management, the owner should have hired an expert.
7. Common sense needs no approval. Common sense and logic do not have to be tested before being implemented. If the concepts were accurate, the concepts would work everywhere.

The concepts of IMT were developed in the Kashiwagi home (1976 – present). Examples from the Kashiwagi family that simplify IMT concepts are taught to industry practitioners due to general knowledge and commonality of family practices by most construction practitioners. By transforming these concepts from the realm of common family practices to the perceived more complex and different construction industry environments, the researchers were able to bypass the discussions of technical experts who are often focused on complex industry details and variables which usually only led to confusion and no action.

Construction Industry Structure and Practices

PBSRG research concepts identified by observation were:

1. Owner control of projects is a major source of nonperformance.
2. Owner decision making in the selection of contractors and project/risk management were a major source of risk.
3. Owner management, direction and control of vendors increase project risk.
4. Transparency is created by minimizing owner decision making and by vendors restricting their communications to performance metrics.
5. Expert vendors have no risk.

These concepts are used in the BV PIPS structure. Instead of discussing each point with industry participants who did not understand, PBSRG ran repeated testing of BV PIPS with industry visionaries. The test results validated the industry structure concepts. PBSRG gambled that it would be more effective over 20 years to:

1. Not compromise the IMT concepts with traditional industry approaches.
2. Work only with industry visionaries and bypass the majority of industry participants and peer reviews.
3. Focus on simplicity.
4. Use the deductive approach.
5. Test the concepts and quickly turn around the test results.
6. Document the results using simple metrics of customer satisfaction and project deviations.
7. Continually perform tests (repeated testing).
8. Use dominant test results to replace the need for peer reviews from other academic researchers. If the results were not dominant, there was no value to the research.

Positive Impact to the Industry

PBSRG identified its major goal to impact the industry. The secondary goal was to find industry visionaries who would assist in changing the industry. If the industry leader did not agree with PBSRG's concepts, PBSRG did not work with them. Work is only done with visionaries who understand the simplistic concepts. PBSRG put on a schedule of presenting to the industry 50 times a year to identify industry visionaries and to get research grants. The result of the effort has validated the concepts (PBSRG 2012):

1. Length of research effort: (1993-present, 19 years)
2. Research funding: $12M
3. Number of research tests: 1,600+
4. Amount of construction and other services delivered: $4B
5. Number of states in U.S. which participated in research tests: 9 states (17.6% of all U.S. states)
6. Change the construction procurement law in two states: Oklahoma and Minnesota.
7. Number of different countries who participated in research tests: 6 countries (Finland, Netherlands, Botswana, Canada, Malaysia and United States)
8. Number of refereed conference and journal papers: 200+
9. 98% customer satisfaction of test results
10. Minimized owner transactions by up to 90%.
11. Increased vendor profit by as much as 100%.
12. Assist low performing contractors to perform using the BV structure.
13. Industry awards:
    a. 2012 IFMA Fellow, International Facility Management Association for BV PIPS Development,
    b. 2012 Dutch Sourcing Awards – Best Overall Procurement Effort & Operational Excellence – Rijkswaterstaat BV PIPS Implementation,

c. 2011 IFMA Minneapolis/St Paul Chapter Facility Practitioner of the Year – ISD 287 FM Implementation of Best Value.
d. 2011 George Cronin Silver Award for Procurement, State of Idaho Dept. of Admin. Div. of Purchasing, National Association of State Procurement Officials (NASPO).
e. 2009 Educator of the Year Award, International Facility Management Association Awards of Excellence for outstanding research using BV PIPS,
f. 2008-2009 Fulbright Scholar Award to implement BV PIPS in Botswana at the University of Botswana,
g. 2007 COAA Gold Award, City of Peoria implementation of Best Value.
h. 2007 FCM's Station Style Gold Medal in Design, City of Peoria utilizing BV PIPS,
i. 2005 H. Bruce Russell Global Innovator's Award, CoreNet Global, Corporate Real Estate, Harvard University Implementation of BV PIPS, 2001
j. Pono Technology Award, State of Hawaii and Implementation of BV PIPS Technology.

The PBSRG research effort to change the construction environment from a price based and owner controlled environment to a best value environment is the longest running, highest funded construction management research effort, having the largest number of tests, and the most dominant impact on the construction industry in the most locations in the world. It identified that construction management was an inefficient practice, and should be changed to vendor quality control and owner quality assurance. It is the dominant performance of the BV PIPS system and the performance of the research program that caught the attention of the Dutch visionaries. Without the proven performance and the dominant logic, PBSRG would not have had the opportunity to assist the Dutch to change their delivery system. The authors propose that this is the reason for the ineffectiveness of the construction management research groups in assisting the construction industry to change, a lack of dominant performance results of research groups' proposals. PBSRG proposed that if the research has dominant results that the industry needs, the industry will implement. The industry is interested in decreased project cost, efficient project delivery, and increased vendor profit. PBSRG delivered a best value PIPS system that decreases project cost and increases vendor performance and profits.

Impact of Best Value PIPS on the Dutch Construction Environment

In 2004, PBSRG was brought in to present to the heads of Dutch government agencies by a visionary looking for an answer to the construction dilemma (Rijt & Witteveen 2011). As a result, two interested parties came to Arizona State University (ASU) in 2005: a representative from a large general contractor and two representatives from the largest buyer of construction services, Rijkswaterstaat, responsible for the majority of water and road construction in the Netherlands. The same year, ASU licensed both the Rijkswaterstaat and the third largest Dutch contractor Heijmans to utilize the BV PIPS technology. However, the Dutch academic community reacted to the best value approach as an American idea and resisted any significant testing of BV PIPS. In 2006, Heijmans identified a visionary from the Delft University of Technology, outside of the construction management area, from the supply chain and marketing academic area. They immediately identified the BV PIPS idea as the most accurate explanation and solution to the Dutch construction supply chain problems (Santema 2011). At the same time, visionaries in Rijkswaterstaat were searching for a test opportunity to run the BV PIPS approach. In 2007, ASU agreed to award a license and support the Dutch visionary and their consulting firm, Scenter, and Delft University of Technology. The rationale for the licensing was (PBSRG 2012):

1. Scenter agreed to translate the concepts of IMT, KSM, Industry Structure and BV PIPS into Dutch. This was needed to make the concept of BV PIPS a Dutch idea and give Dutch government groups the opportunity to use Dutch documentation to understand the concepts.
2. Scenter would proliferate presentations of BV PIPS to the Dutch industries.
3. Scenter would search for Dutch industry visionaries and run BV PIPS tests.
4. Scenter would test out the PBSRG research model (Dutch test), and attempt to validate that the model can be duplicated.

Dutch Test

The Dutch test would include the following components:

1. Identify if the new research model created by PBSRG can be successfully implemented by Scenter to bring change to the Dutch construction industry. The validation of this component would be the identification of Dutch construction visionaries' community to run the best value approach.
2. Identify if the concepts of IMT, KSM, BV PIPS and PIRMS could effectively be tested and implemented in the Netherlands (different culture and language).
3. Identify if the research model and research concepts would be able to integrate various silos of the construction delivery process, i.e. procurement, project management, risk management, professional engineers, and major construction buyers.

Rijkswaterstaat Test Projects

Two visionaries in the Rijkswaterstaat organization, Wiebe Witteveen and Carlita Vis, utilizing the expertise of Sicco Santema and Jeroen van de Rijt of Scenter and with the assistance and support of PBSRG, made the $1B (original budget, later reduced to $800M) fast track infrastructure projects at the Rijkswaterstaat the largest best value PIPS tests in the world and the centerpiece of the Dutch effort. Rijkswaterstaat is the government agency that is responsible for execution of the public works and water management, including the construction and maintenance of waterways and roads in the Netherlands (Rijt et al. 2011, Rijt & Witteveen 2011, Andersson Elffers Felix 2010). The road network in the Netherlands (specifically the Randstad area) is heavily congested, with unreliable journey times of one in five during the rush hour. Most of the traffic jams in the Netherlands (81% in 2005) are concentrated in the four largest Dutch cities (Amsterdam, Rotterdam, The Hague and Utrecht), and the surrounding areas. Its 7.5 million inhabitants make up almost half of the population of the Netherlands. In the Netherlands there are extensive procedures preceding road construction. The average lead-time from idea to new road is over 20 years. Construction renovation projects often take 12 years to materialize. A law was passed called "Besluitvorming Versnelling Wegprojecten" (translated:

"Decision for Accelerated Road projects"). This law simplifies some public procedures concerning environmental issues for 30 specific road bottlenecks (traffic jam sources) starting January 1st, 2009. The law enabled Rijkswaterstaat to use some experimental "non-traditional" processes. The Dutch Ministry of Infrastructure and Environment identified 30 major bottlenecks (30 projects started, and ten projects completed) by May 1, 2011. The Rijkswaterstaat selected 16 projects to be completed in three years (2009-2011). The methodology selected to attempt to meet the deadlines was the implementation of BV PIPS. The BV PIPS was modified to meet the requirements of European law. The Rijkswaterstaat plan was made possible by:

1. The Scenter/Delft group and Rjkswaterstaat's ability to translate the BV PIPS into Dutch and modify PIPS to meet the European regulations. Presentations were given to both the Rijkswaterstaat project managers and to the Dutch general contractors. All documentation was in Dutch.
2. The dominant results (100% increase in profit, 90% decrease in owner project management requirements, and 98% customer satisfaction) of the American tests were sufficient motivation for both Rijkswaterstaat and contractor personnel to agree to the BV PIPS approach for the $800M infrastructure package. Less dominant test results may not have had the impact to overcome the resistance against change.
3. The Rijkswaterstaat procurement visionaries Wiebe Witteveen and Carlita Vis were highly educated by PBSRG and Scenter personnel. These two visionaries controlled the entire procurement of 6 packages and 16 projects. The tests were procurement tests and did not emphasize the risk management and project management paradigms of the BV approach. If these new paradigms were also implemented, the results may have been more dominant. Without the visionaries who understood the new paradigm, the tests would not have been possible.
4. The Dutch expertise of Scenter in BV PIPS was critical to the ability of the Rijkswaterstaat to run the tests. Scenter used the PBSRG research model, becoming an extension of PBSRG. The resulting Rijkswaterstaat tests and other Dutch organization implementations of the BV PIPS was a dominant success. The constant support of PBSRG experts to support both Rijkwaterstaat and the Dutch researchers at Scenter was also important.

By observation, the traditional research methodology of conceptual research, prototype testing and implementation of test results would not have led to the successful Dutch tests. The traditional system is too slow, and does not focus on alignment of visionaries and experts. The setting up of Dutch capability to support the BV PIPS tests was done through the creativity of the PBSRG research model. The PBSRG model included:

1. Using the license system to give the licensing rights to the Rijkswaterstaat.
2. Using a business approach to ASU teaching and research requirements to allow PBSRG to support the Dutch effort. Designing the PBSRG research, administration and research partners to act as a business allowed PBSRG to travel and support the Dutch at minimal cost. As the objective was not the "amount of the research funding" but to impact the industry, the success of the Dutch test would be a boon to all the PBSRG research clients. This objective creates an entirely different approach to the integrating of different research client funding. Because PBSRG's research is solely to

test, implement, modify and improve the explanation, methodology and the BV PIPS system, an advancement on any research client's project is an advancement for all the other research clients' projects. This allows PBSRG to use funding of one group in a test by another group. It also allows the using of the concepts in experimental teaching in the ASU and Del E. Webb School of Construction's honors classes.

3. Using the IMT development in the Kashiwagi family to simplify the concepts of the BV PIPS approach and overcome industry and cultural differences and resistance. The "no rules" environment, the inability of Dr. Kashiwagi to change, influence or control his wife and children, the results of the movement toward "no rules" and win-win of the "no rules" transparent family environment accelerated the understanding of the best value approach among the Dutch. The only resistance left was a technical resistance based on the difference of European law.

Rijkswaterstaat Test Results

The Rijkswaterstaat test results included:

1. Scenter and the Rijkswaterstaat successfully implemented the BV PIPS approach. They changed the Rijkswaterstaat construction delivery model from the traditional owner controlled contract to the following while still meeting European law requirements:
2. No control or influence environment over the vendor. The vendor identifies their own scope.
    a. Vendor writes the contract instead of Rijkswaterstaat.
    b. Transfer of risk management to the vendor. The owner only practices quality assurance, which assures that the contractor has their quality control systems and risk management systems in place.
    c. Documented performance of Rijkswaterstaat and the vendors using the BV PIPS weekly risk report.
3. Procurement transaction costs were reduced by over 50% for both Rijkswaterstaat and the construction contractors.
4. 95% of all project deviations were caused by the client. The only reason for projects that are still not completed is the owner driven changes, which the contractor experts identified early in the projects.
5. 14 of the 30 projects where completed, surpassing the goal of 10 projects.
6. Average completion time for projects was reduced by 25%.

The enormity of the change of Dutch paradigm and thinking did not allow for a complete BV PIPS implementation. What added to the difficulty is that PBSRG, even with 20 years of experience with the BV PIPS approach, is still making modifications to improve the understandability and performance of the BV PIPS system. The following areas were not implemented in the Dutch tests:

1. Clarification period. It was thought that this could not be done under European procurement law; however, it is being done in current projects.

2. Dominance check of the price. This is not being done due to potential conflict with European law, but will be analyzed extensively in the coming year.
3. The coordination between the detailed construction schedule and the weekly risk report milestone schedule was not implemented.
4. The understanding of the contractor scope, the methodology of minimizing risk that the contractor did not control and using performance metrics to measure that ability to minimize risk was not implemented.
5. The use of past performance information was also not utilized. European law identifies that in the selection of a contractor; past performance information that relates to previous projects cannot be used.

The use of critical metrics that identify the proposed project team's capability to do the proposed projects was not used. Therefore, the subjectivity of the selection team was used more than advised under normal BV PIPS deliveries. This problem has plagued users of the BV PIPS structure due to the tremendous change in paradigm of the vendor having the risk to show dominant capability instead of the selection committee using their technical expertise to identify capability of a contractor.

Due to the success of the Rijkswaterstaat projects and the continuing education by Scenter of professional consultants, government and private sector owners/procurement personnel and vendors (in and out of construction industry), the following results emanated from the Rijkswaterstaat tests:

1. Knowledge transfer to some of the top professional groups in The Netherlands. Keynote addresses on the BV PIPS approach by Kashiwagi to 2010 NEVI Annual Conference (Dutch Professional Procurement Organization), 2011 PIANO Annual Conference (Dutch Government Procurement Organization), 2012 Dutch National Infrastructure/Road Conference, and 2012 CROW/RISNET (Dutch Technology Platform for addressing project and risk management in transportation, infrastructure and space).
2. NEVI licensing BV PIPS technology from AZ Tech (licensing arm of technology developed at Arizona State University). NEVI is educating and certifying procurement professionals.
3. Formation of BV Board that will participate in the certification of practitioners. The BV Board will include project managers, risk managers, engineers, procurement professionals and supply chain experts. These participants are being trained once a year by the BV originator Kashiwagi in the IMT, KSM, industry structure, and BV PIPS and PIRMS.
4. Award of the 2012 Dutch Sourcing Award to the Rijkswaterstaat for the Dutch Procurement Innovation for public and private organizations in 2012.
5. Movement of the BV technology into the City of Amsterdam.
6. 6 of the 10 biggest municipalities in the Netherlands have been using BV.
7. Movement of technology into completely different areas, such as social work.
8. Acceptance of BV technology by Prorail, the Dutch organization responsible for all rail infrastructure in the Netherlands.

9. Scenter, the Dutch BV expert and PBSRG licensed partner, increased the BV educator/project management team from one to nine (increase of over four-fold) to keep up with demand for BV education requirement in the Netherlands. Scenter has published over 15 papers, published two Dutch books on BV PIPS (> 6000 copies distributed since 2009), given over 100 presentations to over 2,000 attendees, and participated in 50 projects.

Conclusion

Almost every major government organization in the Netherlands has now been exposed to BV PIPS. Rijkswaterstaat and Prorail, the two organizations that control a majority of water, land, and rail infrastructure are implementing BV PIPS into their delivery of services and shaping their organizations into more efficient organizations. The major Dutch procurement organization NEVI is educating and certifying practitioners.

The project managers, risk managers and engineering groups are now getting involved with the BV approach, cooperating with the procurement group NEVI. The BV PIPS approach is moving to industries outside of construction, being proliferated by the procurement professionals.
The Dutch have made the movement from management direction and control, win/lose, owner controlled to alignment of expertise, win/win and vendor controlled. They are continuing to move to communication by metrics, having vendors create transparency where they measure the performance of the government and other stakeholders. The huge paradigm shift has transpired in eight years.

The paradigm shift has validated the new research model of PBSRG. PBSRG, with no government research funding, minimal coordination with peer researchers, simultaneously performing conceptual research, prototype testing and implementation, has run over 1,500 BV PIPS tests and documented dominant test results which have reinforced the simplistic concepts of logic that management, direction and control increases project cost and risk.

Scenter has become the successful "PBSRG of the Netherlands" and possibly Europe. Scenter used the same research paradigm as PBSRG. Using PBSRG's performance and technology as an extension of PBSRG, they have become as successful as PBSRG. They overcame an additional hurdle in that they have moved the technology into the Dutch language and culture.

Dominant results have now replaced the academic peer review in the proliferation of BV PIPS testing. Simplicity replaces complexity. Research that impacts, changes and leads the industry, replaces subjective research that is difficult to implement. The Dutch results are now being reproduced in Canada. Further research in the BV area is needed in the following areas:

1. Impact of culture on BV practices.
2. Optimizing organizations using the BV approach.
3. The impact of the BV approach on performance metrics.
4. Impact of BV approach on project and risk management.
5. The redefining of an expert using the BV approach.

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