

The Introduction of the Best Value Approach in Engineering Services

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The Best Value (BV) environment was introduced into the Netherlands in 2006. By 2008 testing was being done by a partnership of Arizona State University and Scenter [Sicco Santema, professor from Delft University]. In 2010, the first significant test of the BV approach was done by the Rijkswaterstaat to deliver the $1B fast track infrastructure projects, and by 2015, the BV approach had become the "buzzword" of procurement and the professional procurement organization NEVI. However, in the delivery of professional engineering services, larger, more traditional services which were built on a system of relationships between clients and vendors, clients controlling the expert, and the importance of "billable man-hours". The transition from a traditional approach to a BV approach is very challenging. Large traditional professional organizations naturally will have more difficulty adapting to the new approach. The BV approach utilized the expertise of experts to replace the need for relationships and owner management, direction and control [MDC.] It also places less value on traditional practices that have been used by professional services to get business [relationships and working together with the client in a trust based relationship]. The study captures the efforts of a very successful engineering firm [the second largest in the Netherlands] as they attempt to become successful in this new approach. The best value team that they have put together has had outstanding results in using the BV approach to changing their paradigm.

Keywords: Professional services, best value, Netherlands, Royal HaskoningDHV, delivery of services

Introduction to the Best Value Effort and Dutch Engineering Services

Professional services were always selected differently from other construction services. They were identified as professional services which used engineering principles to solve and provide solutions to owner requirements. The industry developed a selection system called Qualification Based System or QBS, which selected designers based on the professional's past performance, professional licenses, professional relationships and technical knowledge in the firm (Child, Sullivan & Kashiwagi, 2010; D. Kashiwagi, J. Kashiwagi & Child, 2014). The QBS system resulted in a system where the owner's selected the professional firm based on relationships, marketing brochures and firms' reputations. The selection process resulted in client's selection boards deciding who was the best qualified. In many government environment's, price is not a selection criteria. After the QBS was performed, a professional service is selected and price is negotiated. Oftentimes, it is a fixed percentage of the construction cost.

The QBS and other similar selection systems resulted in professional services having the following practices (Child, Sullivan & Kashiwagi, 2010; D. Kashiwagi, J. Kashiwagi & Child, 2014; Sullivan & Michael, 2011):

1. Depending on marketing and relationships to get their work.
2. Professional services becoming more reactive to the clients' needs.
3. Strong relationships become the solution for engineering and design issues.
4. Design schedules becoming less important leading to design change orders and redesigns.
5. Large design services becoming more fixated on maintaining "billable man-hours" than utilizing their expertise.
6. More administrative and meeting duties than utilizing technical expertise.
7. A void of project management skills which concentrated on profit margin, efficiency, effectiveness and maximizing profit/return to the company.

These practices led to the following results (Egan, 1998; FMI / CMAA, 2004; FMI / CMAA, 2010; Sullivan & Michael, 2011; Tucker, 2003):

1. Poor customer satisfaction.
2. Clients reviewing the professional's work, and managing, directing and controlling the professional services.
3. The owners/clients' had a poor perception of designers and engineer's capability, quality of work and professionalism.
4. An inability in a large design firm to identify the expert, select the expert for a project and allow the expert to plan the project from the beginning to the end [utilizing their expertise to estimate quantities and identify the risk that other stakeholders bring to the design project and mitigating the risk by creating transparency and through a risk mitigation plan].
5. Work was procured through a marketing/relationship process called the Qualification Based System (QBS). The selection of the firm is done through an owner's selection board that decides who is the best qualified, then negotiates a contract with the selected vendor.

These design practices are in all countries and cultures [underdeveloped, developing and developed countries]. The authors have been in Africa, Malaysia, China, U.S. and Europe in which the practices are observed to be the same.

The Best Value approach has been in the Netherlands since 2007. The Rijkswaterstaat [tasked with maintaining roads and waterways in the Netherlands] delivered the "fast track projects" using the Best Value approach [known as best value procurement or BVP]. The following results were realized (Van de Rijt, Witteveen, Vis & Santema, 2011):

1. Procurement transactions and costs were minimized by 50%.
2. Construction time was minimized by an average of 25%
3. 95% of all project cost and time deviations were caused by the owner/client and their professional services.

Professional services were also procured by the BVP approach. Immediately, the following problems were observed (J. Kashiwagi, Sullivan & D. Kashiwagi, 2009; Kashiwagi, 2014b):

1. The design professionals were reactive and not used to being accountable to setting a plan, identifying the deliverable to be delivered, making the assumptions that should be made utilizing their expertise, and having a risk mitigation plan that minimized the risk that they did not control.

2. The owner/client's project managers were confused and thought that the clarification period was a time to make the contractors do work to identify all the unknowns.
3. The design services faced the challenge of how to identify and utilize expertise in their own organizations.
4. Large design organizations were confused how to match their need to transform their approach from concentrating on "billable hours" to utilizing expertise.
5. The definition of an expert was in question. Years of experience, education degree and leadership position in the company may no longer be sufficient to be identified and work as an expert.

The Performance Based Studies Research Group (PBSRG) identified the following about the Dutch Best Value movement:

1. Per capita, it was the most progressive best value (BV) effort in the world, with most number of certified experts, the largest number of BV technology licenses, more major government clients involved in best value tests and the only country where the professional procurement group [NEVI] and the professional risk management and engineering group [RISNET], which includes the professional organization of the engineering and design firms, are all licensed in the BV technology from Arizona State University (ASU) and their technology licensing group AZTECH (PBSRG, 2012).
2. BV consulting groups proliferating the BV practices including Scenter [led by Sicco Santema, the best value visionary of the Netherlands], NEVI [3rd largest professional procurement organization in the world], Best Value Europe [organization committed to spread BV throughout Europe] and the Dutch Professional Engineering Organization which is a member of the European Professional Engineering Organization (Kashiwagi, 2014b). The group Scenter and the European Professional Engineering Organization is now spreading the BV approach to both Norway and Poland, translating the Dutch Best Value Procurement (BVP) book into both Norwegian and the Polish languages.
3. The largest government organizations in the Netherlands were participating with the BV effort including Rijkswaterstaat, ProRail, Netherland Rail Service, waterboards, and major cities such as Rotterdam, Amsterdam, Utrecht, and Groningen (Kashiwagi, 2014b; Van de Rijt & Santema, 2013).

Problem: How to Transform Professional Services to a Performing Industry

For the BV effort to be sustainable, PBSRG was interested in three major areas: professional services, medical services and IT or ICT services. Professional service was a primary target because the traditional delivery of the professional services was an area where performance was very low (Child, Sullivan & Kashiwagi, 2010; D. Kashiwagi, J. Kashiwagi & Child, 2014; Egan, 1998; FMI / CMAA, 2004; FMI / CMAA, 2010; Sullivan & Michael, 2011; Tucker, 2003):

1. Management, direction and control was being utilized to minimize risk.
2. It is a commodity area that was being differentiated based on relationships.
3. The professional services had a very poor customer satisfaction rating.
4. The professionals are the first to touch the delivery of construction services and were identified in the Netherlands billion-dollar infrastructure project as the source of 90% of the project cost and time deviations (Van de Rijt & Santema, 2012).

5. In PBSRG construction project tests, the design services and the owner's decision making was the largest source of project cost and time deviations. The owner's representatives and the design services were indistinguishable. They were one entity and were the largest problem in the delivery of construction services (J. Kashiwagi, Sullivan & D. Kashiwagi, 2009; Kashiwagi, 2014).

To have a larger and more sustainable impact on the performance of professional services, PBSRG searched for visionaries in one of the more traditional larger professional services companies.

Methodology

Approach

The research approach was simple:

1. Identify one of the largest engineering professional services company.
2. Identify if there were visionaries who understood the BV approach in the company.
3. Assist in organizing a core team of BV experts.
4. Identify the strategic plan to transform the large organization into an organization that could utilize the BV approach to increase efficiency, effectiveness and margin/profit for their organization.

Research

PBSRG set on the following plan to meet the research objectives:

1. Presented to the Dutch professional engineering organization.
2. Identify one of the larger organizations who had visionaries.
3. Educate and train the visionaries in the best value approach.
4. Identify if they could follow the BV approach to give their organization the ability to utilize the best value approach.
5. Convince the core group to utilize metrics.
6. Identify if the metrics can be refined to increase the support of the rest of the organization.
7. Pick a case study which shows the success of the BV approach.

History of BV with Professional Engineering Groups

From 2011 – 2012, PBSRG started to brief professional engineering firms. The Dutch professional engineering group [under RISNET, the Dutch risk management professional group]. In 2012, PBSRG was contacted by the second largest engineering and design firm in the Netherlands, Royal Haskoning DHV. Royal Haskoning DHV is an independent, international engineering and project management consultancy with over 130 years of experience. Their professionals deliver services in the fields of aviation, buildings, energy, industry, infrastructure, maritime, mining, transport, urban and rural planning and water. Backed by expertise and experience of nearly 7,000 colleagues across the world, they work for public and private clients in more than 130 countries on five different continents (Royal Haskoning DHV, 2014). A visionary, Elske Bosma, in the company reached out to PBSRG for some guidance, and PBSRG started a relationship to assist them become a best value expert.

In 2014 RISNET licensed the BV approach technology from ASU, and the Dutch professional engineering group, a subset of RISNET, acquired access to all the training materials. The Dutch professional engineering group under the leadership of Paul Oortwijn, started presenting the BV approach at the European Engineering Association in 2013, resulting in interest from Norway and Poland. Partnering with the Scenter group [private group which partnered with PBSRG to bring the BV effort into the Netherlands], the Dutch Best Value Procurement (BVP) book is being translated into both Norwegian and Polish languages, with the Polish book to be introduced to the Polish professional engineering group in March 2016.

Development of the Royal Haskoning DHV Best Value Effort

PBSRG had already researched how to transform a large organization to have the capability of providing the best value (Kashiwagi, 2015). The following approach and assumptions are mandated by a large bureaucratic organization:

1. There is no controlling any individuals in the company to change their conceptual thinking by management, direction or control (MDC) or influence.
2. To expect engineers to change was to increase the risk of failure.
3. Visionaries had to be identified by their affinity to the concepts of Best Value (BV) and Information Measurement Theory (IMT) which include logic, consistency, leadership characteristics and proactive motivation to make things better.
4. The group should start small.
5. Education is very important to identify more visionaries. However, after an initial push to educate, the education effort should be transformed into a implementation effort within the organization and marketing effort with clients.
6. People in the organization who do not understand BV, are focusing on amount of work (turnover and profit margin).
7. The BV core group will have to develop metrics that minimize decision making of the organization as soon as possible.
8. The BV group must have a mentor.

The following is a historical account of dates and activities of the development of the RHDHV best value effort led by Elske Bosma, Marcus van der Ven and Oscar Kerkhoven (E. Bosma, Personal Communication, December 9, 2015):

1. April 2012: Elske Bosma starts a BVP network within DHV
2. June 2012: Elske meets Marcus van der Ven, Oscar Kerkhoven and Fred Haarman, who gained experience with BV at Royal Haskoning DHV. They start with the effort to improve the Best Value tender success rate within the new company RHDHV. This was the start of the Best Value core team.
3. September 2013: The BV core team meets with Dean Kashiwagi. The BV core team also brings 2 colleagues of the higher management of RHDHV. Dean is very much interested in the BV effort of the core team.
4. December 2013: The BV core team presents their strategic plan to the executive board of RHDHV. The board approves the plan. A member of the execute board becomes the sponsor of the BV core team.
5. January 2014: Marcus, Oscar and Peter Edward attend the BV Conference in Phoenix, Arizona

6. May 2014: Dean visits the RHDHV's head office in Amersfoort. Over 100 employees of RHDHV attend his presentation and/or the workshops.
7. October 2014: Marcus obtains the A+ certification [Highest BV certification]
8. November 2014: The BV core team starts to give the 2.5-day Best Value course to educate colleagues for the B-certification [Entry level certification]
9. January 2015: The BV core team and 5 other colleagues attend the BV Conference in Phoenix, Arizona
10. June 2015: Dean visits the RHDHV head office in Amersfoort. Appr. 80 persons of RHDHV attend his presentation and/or the workshops.
11. October 2015: Oscar obtains the A+ certification.
12. October 2015: BV team expands group with 3 more persons [One of the three is in the higher management of RHDHV]. Of the BV core team 6 persons of RHDHV will attend the Best Value Conference in Arizona in January 2016.
13. December 2015: The core team has educated over 50 colleagues (B- certification) in 2014/2015.

RHDV Metrics

One of the objectives of the BV approach is to use metrics to minimize decision making inside and outside of the organization. The BV core team had the following objectives (Royal Haskoning DHV, 2015):

1. Show increased value of the core team activities.
2. Show that if the BV approach and the BV core team was utilized, the amount of work acquired and the success rate should increase. Logically, when the numbers become dominant enough, policies will be set by the company that help the non-BV experts to utilize the BV core team.

Table 1 shows the core teams' metrics. Table 2 then shows the metrics that minimize decision-making, and will lead to changing RHDHV policies. The RHDV core team also identified a BV expert who began keeping metrics on his own procurement projects [Table 3 and 4]. PBSRG will continue to work with RHDHV and the engineering consulting professional groups in the Netherlands, Norway and Poland to assist the industry to transform itself into a best value industry.

Table 1
Royal Haskoning DHV Performance Metrics to Minimize Decision Making

Performance Criteria	2015
# years BV core team	3+
# BV procurement as client PM	12
# BV tenders for engineering consultancy projects	24
# won	11 (46%)
# BV tenders in consortium for construction projects	13
# won	2 (15%)
# BV interview training key personnel	50+
# BV procurement educations	20+
# BV presentations	50+

# BV knowledge meetings	10+
# BV presentation for higher management	3
# A+ Certifications	1
# B+ Certifications	8
(Royal Haskoning DHV (2015) Best Value Performance Metrics. Unpublished raw data.)	

Table 2

Royal Haskoning DHV Performance Metrics

Performance Criteria	**BV Support**	**No BV Support**
# of Tenders	14	24
Tenders Won	6 (43%)	7 (29%)
Scored 1st or 2nd in PC Submittals	13 (93%)	14 (58%)
Risk Assessment Score	5.8	5.3
Value Added Score	6.2	6.1
Level of Expertise	7	5.8
Interview	7.4	6.5
(Royal Haskoning DHV (2015) Best Value Performance Metrics. Unpublished raw data.)		

Table 3

Overall Performance Metrics on Procure Company Projects

#	Performance Criteria	Results	Comments
1	**# BV projects as client PM**	10	-
2	**Scope (Euros)**	42M	-
3	**% client satisfaction >8 (1-10)**	100%	-
4	**% running below budget**	100%	-
5	**Average % below budget**	-15%	-
6	**Average % cost deviation**	3%	(100% caused by client risk)
7	**% running on time**	70% (7/10)	(66% caused by client risk)
8	**Average % schedule deviation**	6%	-
9	**Estimated cost efficiency**	20-30%	-
10	**Performance Criteria**	Results	Comments
(Royal Haskoning DHV (2015) Best Value Performance Metrics. Unpublished raw data.)			

Table 4

Individuals Performance Metrics on Procure Company Projects

#	Project	Budget (M euro)	Contract value (M euro)	Progress	Time deviation	Estimated cost reduction contract management
1	**Pumping Station Schore**	2.60 M	2.40 M	100%	1%	0%
2	**Pumping Station Schilthuis**	0.69 M	0.68 M	95%	0%	20%
3	**Ankie van Beek Ohrlaan**	0.56 M	0.54 M	100%	2%	1%
4	**Pumping Station Essenburgsingel**	2.25 M	1.94 M	40%	0%	15%
5	**TenSec 2.0**	28.30 M	25.00 M	20%	2%	0%
6	**INFRA1**	5.40 M	4.90 M	20%	0%	1%
7	**Sewage System Triangel**	1.20 M	0.74 M	100%	20%	20%
8	**Renovation 7 Pumping Stations**	3.50 M	2.21 M	30%	0%	0%
9	**Sewage System Westergouwe**	1.12 M	0.90 M	40%	3%	0%
10	**INFRA2**	3.00 M	2.90 M	10%	0%	0%
(Royal Haskoning DHV (2015) Best Value Performance Metrics. Unpublished raw data.)						

Conclusion

The professional engineering organization in the Netherlands has been proliferating the Best Value approach and the Information Measurement Theory (IMT) concepts. They have been successful in

moving the technology into Norway and Poland. PBSRG has identified and is mentoring the second largest engineering firm in the Netherlands, Royal Haskoning DHV (RHDHV) into increasing its BV capability and utilizing metrics to minimize the decision making in their organization.

The following have been successfully achieved in this case study research which uses mixed methods to verify the changes. The results include:

1. Selected Royal Haskoning DHV as the large engineering service.
2. RHDHV selected a core team.
3. Core team educated their organization and used metrics to show their activity.
4. Core team refined their metrics to show their organization that the core team should be utilized to increase RHDHV's competitiveness on potential projects.
5. Identified a BV expert within the core team to compete for and run BV projects. The BV expert has been extremely successful.

References

Child, G. S., Sullivan, K., & Kashiwagi, D. (2010). Delivering the Design Services and Other Professional Services. PM-05-Advancing Project Management for the 21st Century, Heraklion, Crete, Greece, 152-159.

Egan, J. (1998). Rethinking Construction, Construction Task Force Report for Department of the Environment, Transport and the Regions.

FMI / CMAA Fifth Annual Survey of Owners (2004). Management Consulting - Invesment Banking for the Construction Industry. Retrieved December 9, 2015 from http://www.cmaafoundation.org/files/surveys/2004-survey.pdf.

FMI / CMAA Fifth Annual Survey of Owners (2010). Management Consulting - Invesment Banking for the Construction Industry. Retrieved December 9, 2015 from http://www.cmaafoundation.org/files/surveys/2010-survey.pdf

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

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

Kashiwagi, D., Kashiwagi, J., & Child, G. (2014). Price Based Environment of Design and Engineering Services. Journal for the Advancement of Performance Information & Value, 6(1).

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

PBSRG. (2012, July 3). Best Value in the Netherlands: NEVI Certification, DSA Award, and Upcoming Events «. Retrieved December 8, 2015, from http://pbsrg.com/publications/newsletters/best-value-in-the-netherlands/

Royal Haskoning DHV (2015) Best Value Performance Metrics. Unpublished raw data.

Royal HaskoningDHV (2014) Royal Haskoning DHV Annual Report 2014. Netherlands: Royal HaskoningDHV Marketing & Communications.

Sullivan, K. T., & Michael, J. K. (2011). Performance Measurement Approach to Contracting and Delivering Design Services. Journal of Professional Issues in Engineering Education & Practice, 137(4), 248-257.

Tucker, W. W. (2003). Construction Productivity Study: Executive Summary. Michigan Tri-partite Committee. URL http://www. mitripartite. com/ExecutiveSummaryl. pdfMangasarian (visited 2009, 2 September).

van de Rijt, J., Witteveen, W., Vis, C., & Santema, S. (2011). Best Value at the Directorate-General for Public Works and Water Management in The Netherlands: A Case Study of the Procurement of Infrastructure Projects Worth $1,200 M. Journal for the Advancement of Performance Information & Value, 3(1).

Van de Rijt, J.., & Santema, S.C. (2013). Prestatieinkoop: met Best Value naar succesvolle projecten. Driebergen: Graphicom International.