Towards the Best Value vendor

A study to BVP tenders from a private party's perspective

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Master thesis

TU Delft

Royal HaskoningDHV

Enhancing Society Together

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PREFACE

This master thesis contains the results of my graduation research on Best Value Procurement (BVP) from a private party's perspective commissioned by the Delft University of Technology. It is the final step in acquiring the 3TU master degree Construction Management and Engineering (CME). For me personally, it is the end of an era and the start of a new one. I leave my life as a student behind and I look forward to start with my professional career.

My graduation research has been carried out during an internship at Royal HaskoningDHV, which I have experienced as very interesting and instructive. I would like to start to thank all employees for showing me the way within the company and of course for the memorable time. Also I would like to thank all interviewees for providing me with their personal experiences. These have been essential for the execution of my research. Special thanks go out to my internal supervisors, Marten Hillen and Fred Haarman, for their contribution in the many meetings in which they have provided me with new ideas and critical reviews. I have experienced our collaboration as very pleasant and fruitful.

I am also grateful for the support of my graduation committee from the Delft University of Technology. Thank you, Sicco Santema, Leon Hombergen and Mathijs van Ledden for your assistance during my graduation process. I have learned a lot from your scientific knowledge and your experience from practice, which has made me even more enthusiastic about this field of interest.

Last but not least, I would like to thank my friends and family for the many nice moments in the past years, but also for acting as a sounding board when needed. Of course, I would like to thank my parents in particular for the unlimited confidence in me and supporting me during my time in Delft. All these contributions together have helped me to make this possible!

Delft, September 2013

Axel Booij

SUMMARY

This master thesis contains a graduation research to projects in which *Best Value Procurement* (BVP) is implemented as the award mechanism. The report has been composed during an internship at Royal HaskoningDHV which contributes to the completion of the master Construction Management and Engineering at the Delft University of Technology.

The incentive for this master thesis research lies within the fact that currently there is insufficient knowledge of BVP from the perspective of the vendor. Engineering companies have the desire to learn how to anticipate on this new development in the procurement of the Dutch construction industry. In response to this, the following research question of engineering companies to investigate opportunities to improve their performance projects that are tendered with the BVP award mechanism. In respond to this, the main research question of this master thesis is formulated below.

"What are the opportunities for vendors to increase the scores on the award criteria in BVP tender procedures in order to structurally improve the success rate in tender procedures procured with the BVP award mechanism?"

First, a closer look is taken at the BVP award mechanism and the BV philosophy. In the theoretical framework the fundamental underlying theories are investigated, i.e. the Information Measurement Theory (IMT) and the Kashiwagi Solution Model (KSM). Besides the practical implementation of the BV philosophy from the client's point of view (BVP), also insight is provided from the vendor's point of view, i.e. *Best Value Sales* (BVS). In the figure below the number of projects that are tendered with the BVP award mechanism are shown. These prospects seem to predict a bright future.

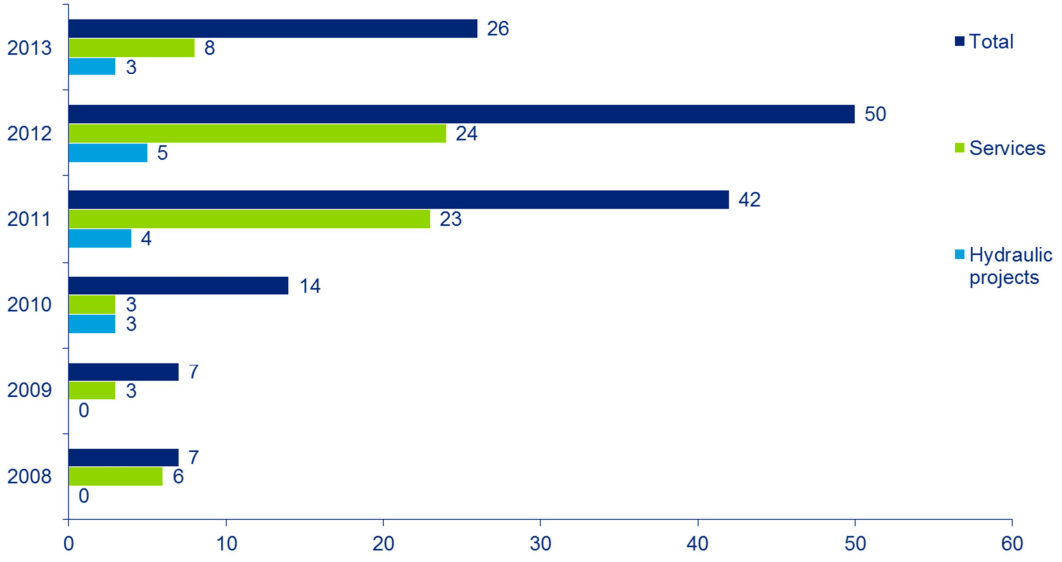

Figure S1: BVP tenders in the Netherlands. (Pianoo Expertisecentrum, 2012)

With the theories about BV in mind, there is moved on to the practical component of the research. In the case study three projects are investigated that have been tendered with the BVP award mechanism. All three projects are concerned with plan studies in the field of hydraulic engineering and in every one of them Royal Haskoning and DHV have participated. Here, the performances of both vendors are put under the microscope and it is investigated how these performances have come about. This is done based on an

evaluation on the tender assessments of Rijkswaterstaat and on the interviews with employees that have participated in these projects.

From the tender assessments and the interviews *points of attention* are retrieved that have the potential to contribute to increase the scores on the award criteria. These suggested opportunities are related to both context improvements and organisational improvements. Two examples of these points of attention are (1) coupling risks and opportunities to the project objectives and (2) developing internal BV standards. Most important point of attention that has been indicated by both client and vendor is the SMART formulation of the tender documents and the answers during the interviews. Therefore, this opportunity is worked out more extensively during the design phase.

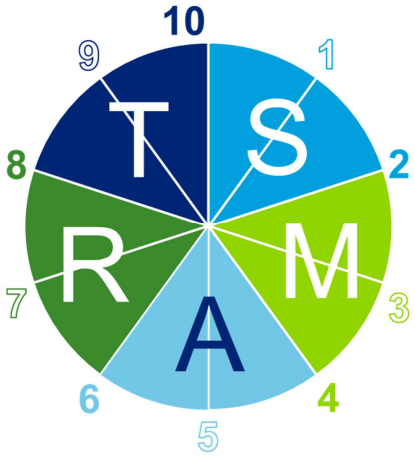

Figure S2: SMART assessment tool.

In the figure above, the developed SMART assessment tool is shown, with which the formulation of tender documents or interviews can be assessed. SMART is an acronym for Specific, Measurable, Attainable, Relevant and Time-bound and the tool assesses every formulation based on these five conditions. For every single condition two points can be earned, as indicated for the condition ‘specific’ in the table below.

Example condition ‘specific’	Appreciation	Score
Not specific	Bad	0
Rather specific	Neutral / N.A.	1
Specific	Excellent	2

Table S1: scoring card for the specific condition of the SMART assessment tool.

This way, the maximum score for the five conditions together is ten points, which is visualised in figure S2. The SMART assessment tool has been applied on the tender documents of one of the projects in the case study and suggestions for improvement have been put forward. During the SMART assessment the condition ‘measurable’ is indicated as the condition with the most potential for improvement.

Finally, this report concludes with the establishment of the BV organisation in order to move towards the BV vendor. Therefore, there is zoomed in on three levels in the organisation, i.e. the BV support team, the BV tender team and the BV individual. This part is concluded with the notion that it is most important to be aware of the personalities within these teams in order to utilise the capabilities of each BV individual and optimise the performances of the teams.

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LIST OF ABBREVIATIONS

Abbreviation	Description
AIE	Average Improvement to Excel
BV	Best Value
BVP	Best Value Procurement
BVS	Best Value Sales
EMAT	Economically Most Advantages Tender
IMT	Information Measurement Theory
KSM	Kashiwagi Solution Model
MBTI	Myers Briggs Type Indicator
PBSRG	Performance Based Studies Research Group
PIPS	Performance Information Procurement System
wAIE	weighted Average Improvement to Excel

PART A: INTRODUCTION

***"The greater danger for most of us lies not in setting our aim too high and falling short; but in setting our aim too low, and achieving our mark."* - Michelangelo**

The chapters background and problem definition are about the 'what' and the 'why' of the thesis research. The 'what' is articulated in the problem definition, the research objectives and the demarcation of the scope and the 'why' is expressed by the background and the scientific, practical and societal relevance of the research.

BACKGROUND

More than ten years ago the Dutch construction industry was confronted with the large scale commotion in public tendering procedures: the construction fraud affaire. In 2001, former member of the board of directors of the construction company Koop Tjuchem, Ad Bos revealed the large scale “shadow bookkeeping account” in which many Dutch construction companies were involved.

Subsequently, the Dutch parliament started a parliamentary enquiry to investigate the dimensions of this scandal. It appeared that during a period of ten years Dutch construction companies distributed projects among themselves and compensated the ‘losing’ competitors for at least the amount of the costs for the preparation of the tender. The deceit concerned over three hundred companies and the total costs counted up to several hundreds of millions of guilders. (Zembla, 2001)

Up until 1993, the formation of cartels had always been permitted by law in the Netherlands, as long as the public interest remained unharmed. However, after the urgent request of the European Union the competition law (Dutch: mededingingswet) was implemented in 1998 in order to stimulate a free market system and increase competition. (Nederlandse Mededingingsautoriteit, 2002) From that moment on, the private procurement parties in the Netherlands mostly put up work to tender in a traditional way, i.e. allocation to the lowest tender. The only opportunity for construction companies to distinguish themselves was on lowest price. Consequently, in spite of the competition law, the Dutch construction companies continued fixing prices in secret.

In the years after the construction fraud affair, it had become clear to the public parties that change was needed in the Dutch construction industry. This resulted in the emergence of innovative visions and ideologies and accelerated the implementation hereof in new policies. For instance, Rijkswaterstaat put forward the ‘Market unless…’ (Dutch: de markt, tenzij…) policy, through which it aimed to transfer the responsibility from the public to the private sector. Likewise, client and vendor started to collaborate in Public Private Partnerships (PPP) and innovative performance based contracts were introduced, e.g. Design and Construct (D&C) and Design, Build, Finance and Maintain (DBFM). (Rijkswaterstaat, 2008)

Together with this rising demand for integrated contracts, also the demand for innovative procurement systems increased, since this is seen as crucial for project success. Instead of lowest price award mechanism, now the focus is on value-based award mechanisms (Dutch: gunnen op waarde). (Rijkswaterstaat, 2011) In 2005 Rijkswaterstaat implemented the Economically Most Advantages Tender (EMAT) award mechanism in which qualitative elements are monetized and with which the price is deducted for each proposal. Finally, the project is awarded using the ‘value minus price’ system or the ‘value-price ratio’ system. (Dreschler, 2009)

Together with the innovative contracts, the EMAT award mechanism hampers the possibility for construction companies to make price arrangements and it has been made possible to award the project to the best vendor available based on other criteria than budget. Although this is a tremendous improvement on the previous situation, the EMAT award mechanism also has its limitations in practice. For example, Rijkswaterstaat still experiences difficulties with the outsourcing of the knowledge to the

market. Despite of the decreasing knowledge within the organisation of Rijkswaterstaat, prescribing the vendor how to perform apparently is not entirely out of its system. Unfortunately, this way the vendor's capabilities are not utilised optimally.

In the pursuit for progress, in 2009 Rijkswaterstaat has introduced another procurement method, i.e. Best Value Procurement (BVP). This procurement strategy has been developed by Dean Kashiwagi (Arizona State University, USA) in the late eighties and the nineties of the 20th century and is often received with positive reviews. The BVP philosophy aims at the procurement and the realisation of projects with the highest value for the lowest price. In the USA over four hundred BVP projects have been evaluated with the following results: (1) 98% of the projects are on time and on budget; (2) 98% of the projects meet the client's expectations, (3) up to 80% reduction of the management effort for the client; and (4) more value for money for the client and more profit for the vendor(s). (Kashiwagi, 2004)

These appraisals have drawn the attention of Rijkswaterstaat for the accelerated realisation of the so-called emergency approach (Dutch: spoedaanpak) of thirty road expansion projects in the Netherlands. After the consultation of several market parties (e.g. Bouwend Nederland, NL Ingenieurs) the Dutch parliament House granted approval for the enactment with a large majority. Fourteen of the thirty projects have been tendered with regular procurement methods (e.g. D&C, DBFM), since these projects already had reached an advanced stage of the procurement at that time. However, the remaining sixteen projects have been procured using the principles of the BVP methodology, or its Dutch equivalent prestatieinkoop. (Rijt & Santema, 2011)

The main objective of the emergency approach was to start all road projects before May 2011 and to complete at least ten out of thirty road projects before May 2011. In a letter to the chairman of the Dutch parliament, the Dutch minister of Infrastructure and Environment, Melanie Schultz van Haegen, presented the final outcomes of the emergency approach: 28 out of 30 projects have started and 16 projects have been completed already. Although the objective has not been attained entirely, the project nevertheless can be called a success. (Ministry of Infrastructure and Environment, 2011)

These satisfying results have stimulated Rijkswaterstaat to put more projects on the market and also within private organisations the BVP award mechanism has been received positively. In September 2012, Rijkswaterstaat awarded the engineering company Royal HaskoningDHV with its first successful tender in a project procured with the BVP award mechanism, i.e. the (exploration for the reinforcement of the) Houtribdijk project.

Expectations are that the BVP award mechanism will be applied more and more in the procurement of future projects in the Netherlands and therefore private parties realise that the BVP mind-set must be implemented within their organisations. This report will contribute to the optimisation of BVP within the business line Rivers, Delta's and Coasts of Royal HaskoningDHV.

1 PROBLEM DEFINITION

1.1 Problem description

The intention of Rijkswaterstaat to increase the application of the BVP award mechanism in Dutch procurement procedures brings about a paradigm shift in the relation between public and private parties. Formerly, the client was inclined to define standards in their *Requests for Proposal* (RFP) in order to guarantee the minimum requirements the vendors had to meet and to prevent non-performance. However, this approach paves the way for non-performers to enter competition. (Rijt & Santema, 2011)

As a result of defining these standards, public and private parties have completely opposite objectives. The client's focus is on the value/price ratio in order to optimise the added value and the vendors focus is the cost/price ratio in order to maximise their profit. This is illustrated in Figure 1-1: basic transaction model (Ridder, 2011). In the paradigm shift the focus of both public and private parties has to move towards optimising the value/costs ratio. This mutual objective creates the highest value for the client and offers vendors to make profit.

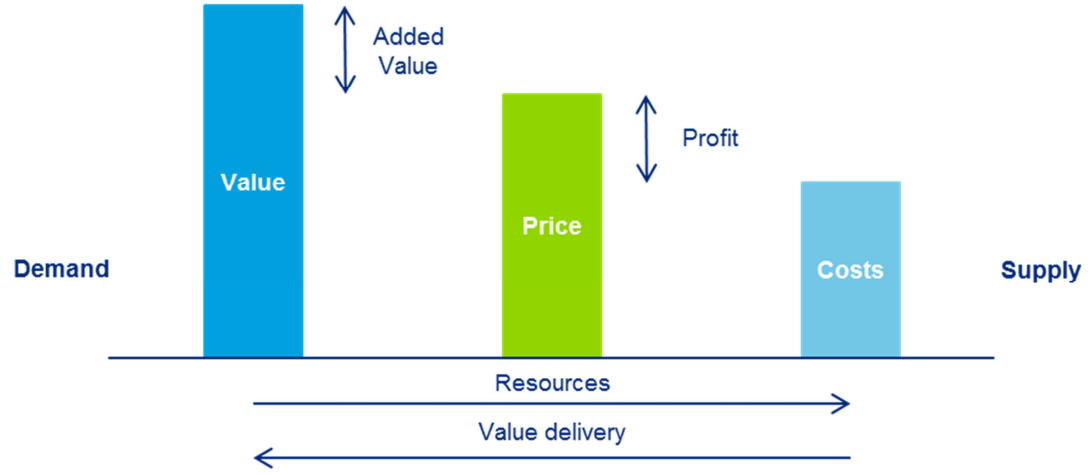

Figure 1-1: basic transaction model (Ridder, 2011).

At the moment Rijkswaterstaat has acquired the necessary experience with the procurement of projects with the BVP award mechanism. The results are received to such an extent that Rijkswaterstaat has won the Dutch Sourcing Award in 2012. (Deloitte, 2012) Subsequently, Rijkswaterstaat has the intention to continue this course with BVP in future projects. Since Rijkswaterstaat is one of the main clients of Royal HaskoningDHV, they are interested to gain more in-depth knowledge about BVP.

Now, towards the problem description, it is important to detect a discrepancy between the current (undesired) and the future (desired) situation concerning BVP. For this report it has been chosen to elaborate on the field of the practical applicability of BVP from the vendor's perspective, since there currently is no such framework available. This results in the problem description stated below.

"At the moment, there is no theoretical framework available to help vendors to increase the scores on the award criteria in BVP tender procedures and distinguish themselves dominantly in order to prepare a tender for projects that are procured with the BVP award mechanism."

1.1.1 Scientific relevance

The BVP related literature that is currently available mainly consists of the following lines of approach:

(1) The BVP fundamentals, e.g. *"Best Value Procurement how to use information systems to minimize risk, increase performance, and increase efficiency"* (Kashiwagi, 2004) and the Dutch implementation hereof described in *"Prestatieinkoop: wie steekt er boven het maaiveld uit?"* (Rijt & Santema, 2011). Besides the fundamentals, these both elaborate on the practical applicability of BVP from the client's perspective;
(2) The practical evaluations of BVP, e.g. *"Evaluatie spoedaanpak"* (Ministry of Infrastructure and Environment, 2011), in which the experiences and best practices of projects are assessed that have been procured with the BVP award mechanism;
(3) The theoretical evaluations of BVP, e.g. *"An evaluation of Performance Information Procurement System (PIPS)"* (Duren & Dorée, 2008), in which links are established with other fields of research.

The limited amount of literature available and the absence of a theoretical framework for vendors illustrate the present knowledge gap in the area of research of BVP. Additional research is required to investigate the possibilities for vendors to prepare projects that are tendered with the BVP award mechanism to their best abilities. Hereby, the scientific relevance of the problem is clarified.

1.1.2 Practical relevance

The practical relevance is concerned with both Royal HaskoningDHV and Rijkswaterstaat. Royal HaskoningDHV is one of Europe's leading independent project management, engineering and consultancy service providers and often works under the authority of Rijkswaterstaat, the most important client of public works in the Netherlands.

With the BVP award mechanism projects are no longer procured on lowest price and therefore vendors are forced to distinguish themselves in showing their expertise. In the BVP mind-set Royal HaskoningDHV has to convince Rijkswaterstaat they are the best vendor available in order to win a tender. In order to surpass competing vendors Royal HaskoningDHV has to submit a tender with dominant scores on the award criteria in BVP tender procedures. Therefore it is relevant for Royal HaskoningDHV to develop a theoretical framework to help them increase the scores on the award criteria in BVP tender procedures in future BVP tendering procedures and have a lead on competing vendors.

The relevance for Rijkswaterstaat is concerned with increasing the average scores on the award criteria in BVP tender procedures, as a result of the increasing competition among vendors. The development of a theoretical framework for vendors to help improve the scores on the award criteria in BVP tender procedures, contributes to awarding the project to the best vendor available that can realise the best value for the lowest costs.

1.1.3 Societal relevance

Rijkswaterstaat is the executive body of the ministry of Infrastructure and Environment in the Netherlands and is responsible for a large share of the procurement of public projects. As these projects are funded with public tax money, the societal relevance is concerned with the reduction of the costs for the construction of public projects and receiving the best value for the lowest price. In designing a theoretical framework for vendors to achieve these objectives contributes to the social interest.

1.2 Research objectives

Evolving from the problem description and the expectations of the parties involved, the research objective is formulated in order make clear how the problem at hand will be assessed. This way, it becomes clear how the problem is delineated. According to the BVP philosophy, it is of importance to define the objectives in a SMART way, i.e. specific, measurable, ambitious, realistic and time-bound. Decisions made in the objectives indicate directions for the scope definition. The research objective is formulated here.

"Deliver recommendations to increase the scores on the award criteria in BVP tender procedures by comparing the current experiences and future expectancies with BVP from both Rijkswaterstaat and Royal HaskoningDHV by conducting a case study to the Afsluitdijk project, the Beatrix lock project and the Houtribdijk project."

To make sure the research objective of the thesis research is achieved, the research objective is divided into eight sub objectives. These sub objectives are divided in four groups and are made measureable explicitly. The 'M' in SMART makes it possible to verify and validate the thesis research after it is completed and help to determine whether the graduation research can be entitled a success.

Basic

1. Mastering the fundamental theories behind BVP, based on the following two books, i.e. *"Best Value Procurement: how to use information systems to minimize risk, increase performance, and increase efficiency"* (Kashiwagi, 2004) and *"Prestatieinkoop: wie steekt er boven het maaiveld uit?"* (Rijt & Santema, 2011);

Practical

2. Comparing the current experiences and future expectations with BVP from both Rijkswaterstaat and Royal HaskoningDHV in the following three projects, i.e. the Afsluitdijk project, the Beatrix lock project and the Houtribdijk project;
3. Delivering at least three recommendations to the business line Rivers, Delta's and coasts of Royal HaskoningDHV in order to improve the current scores on the award criteria in BVP tender procedures in tender procedures using the BVP award mechanism;

Theoretical

4. Designing an innovative theoretical framework for the business line Rivers, Delta's and coasts of Royal HaskoningDHV to realize the two practical

objectives as formulated above, using the "*Design Science in Information System Research"* (Hevner, March, & Park, 2004);

Personal

5. Decent scores, i.e. ≥7, on all requirements that are stated in the *"CME Master thesis assessment form",* available in the Guideline graduation thesis;
6. The final graduation thesis being rewarded with a satisfactory result, i.e. ≥8;
7. Graduating before the summer break, i.e. before the 5th of July 2013;
8. Nomination for the NEVI thesis award (Dutch: "NEVI scriptieprijs") for academic graduation research reports for studies related to procurement management, supply (chain) management and procurement law.

Further specifications of the (main) objective(s) are finalized after the completion of the literature studies and the approval of the master thesis preparation.

1.3 Scope definition

The scope definition is concerned with defining the project boundaries in order to create the solution space for the project. The scope is used to determine which aspects are taken into account during the thesis research and which are not. This is a crucial part of the graduation research, since it gives direction to the final outcome of the research. Here, the scoping is divided in three parts, i.e. theory, practice and design.

Theory

1. The starting point in the graduation research is the field of Civil Engineering, since this is the bachelor degree of the graduate student;
2. The research takes place within the area of Construction Management and Engineering, because this is the master degree the graduate student is writing this graduation research for;
3. Furthermore, within this expertise the graduate student gives preference to the preparatory phases of projects, in particular the tendering procedures, since this is the graduate student's main field of interest;
4. Hereafter, the graduation research concentrates on the subject of Best Value Procurement (Dutch: prestatieinkoop), as both the graduate student and the facilitating company Royal HaskoningDHV are interested in this topic and acknowledge its need and necessity;

Practice

5. In the BVP trajectory the graduation research focuses on the preparatory phase of the procurement project and the award process of the BVP trajectory. Because in these phases Royal HaskoningDHV has to distinguish itself from its competitors;
6. The graduation research is pre-sorted towards the hydraulic engineering sector, since the student has done a minor in this expertise. Besides that, the business line of Rivers, Delta's and Coasts of Royal HaskoningDHV is also concerned with this discipline;
7. In the sector of hydraulic engineering the BVP award mechanism is applied to the plan studies only (no realisation projects), since this is the core business of the engineering company Royal HaskoningDHV;

8. The graduation research is approached from a private perspective, since the outcomes have to contribute to the success rate of BVP within Royal HaskoningDHV;
9. The current experiences of Rijkswaterstaat and Royal HaskoningDHV with BVP will be assessed during a case study on three projects, i.e. the Houtribdijk project, the Beatrixsluis project and the ESA project. Both Rijkswaterstaat and Royal HaskoningDHV have participated in these projects, resp. as the client and the (potential) vendor;
10. The practical information will be gathered by conducting interviews with the employees of Rijkswaterstaat and Royal HaskoningDHV that have been involved in one of the projects mentioned above;

Design

11. The nature of the investigation is based on practical (instead of theoretical) research, because both the student and the organisation of Royal HaskoningDHV desire to achieve new insights concerning the applicability of BVP;
12. Strategically, the investigation is an in-depth (instead of a broad) research in order to increase the complexity and the level of detail and to minimize the uncertainty;
13. Connected to this, a qualitative (instead of quantitative) approach is applied, since the graduate student is mainly contemplatively oriented;
14. The recommendations of this research to Royal HaskoningDHV contain an innovative theoretical framework to optimize the scores on the award criteria in BVP tender procedures and increase the success rate in BVP tendering procedures;
15. The innovative theoretical framework will be developed using the Design Science in Information System Research (Hevner, March, & Park, 2004);
16. The applicability of the developed theoretical framework is put to the test during an interactive workshop within Royal HaskoningDHV;
17. Finally, the graduate student is characterised as an ‘outsider’ during the graduate research in order to guarantee an independent investigation and to prevent biased outcomes.

1.3.1 Out of scope definition

In contrast what is done in the scope definition, the out of scope definition is about those aspects that are certainly not taken into account in this thesis research. This also helps to determine how the field of research of the thesis report will look like.

Although, not elaborated as extensively as the scope definition, the following subjects are out of scope for the thesis research:

1. The pre-award phase in the BVP award mechanism is left out of consideration, because this aspect takes place after the officious allocation of the tender;
2. In April 2013 a new national procurement law will become operative, according to Dutch tender regulations. (Ministry of Economic Affairs, 2012) However, the legal implementation of BVP within the boundaries of European and Dutch law will not be taken into account for the thesis research.

Now the scope and objectives are clearly defined it is time to determine how to realize these objectives. This will be elaborated in the next paragraph in which the research design is exposed. Please note, further specifications of the scope definition are still possible during the research, since new gained insights might influence the direction of the research. Therefore the scope is seen as a dynamic document and consequently adjustments can be made during the thesis research.

PART B: RESEARCH OUTLINE

"If we knew what it was we were doing, it would not be called research, would it?"
– Albert Einstein

In the introduction there is elaborated on the 'what' and the 'why' question of the master thesis. In this part, the research outline, the focus is on finding the answer of the 'how' question. The research process leads the way from the starting point to the final outcome of the research and offers insight in how the 'what' is about to be accomplished.

2 RESEARCH DESIGN

2.1 Research questions

Resulting from the problem definition, the objectives and the scope the main research question has been formulated below.

"What are the opportunities for vendors to increase the scores on the award criteria in BVP tender procedures in order to structurally improve the success rate in tender procedures procured with the BVP award mechanism?"

As the main research question obviously cannot be answered at once, the main question will be broken down into a number of sub questions. On the basis of these questions the main research question will be answered gradually throughout the report.

Theory

1. What exactly is the BVP award mechanism?
    a. How do the Information Measurement Theory (IMT) and the Kashiwagi Solution Model (KSM) contribute to the BV philosophy?
    b. What are the targets of the BVP award mechanism?

Practice

2. Why should the BV philosophy be adopted by engineering companies?
    a. What can be expected of the future plans from potential clients in the construction industry with respect to the BVP award mechanism?
    b. What are the experiences of engineering company's employees with the BVP award mechanism in practice?

Design

3. What points of attention have to be taken into account to increase the scores on the award criteria in BVP tender procedures from a private party's perspective?
    a. Where are the points of attention to be found, that have the potential to increase the scores on the quality criteria in BVP tender procedures?
    b. What steps have to be taken in order to implement these improvements?
    c. What are the thoughts of the employees of private parties on the applicability of the developed tool in practice?

2.2 Research process

The methodology of the research is about how the research is going to be executed. As already mentioned in the scope definition, the nature of the research consists of practical, in depth, qualitative research. In the research approach there can be distinguished five separate phases, i.e. theory, practice, design, validation and evaluation. The phasing of the research is illustrated in Figure 2-1: phases in the research process

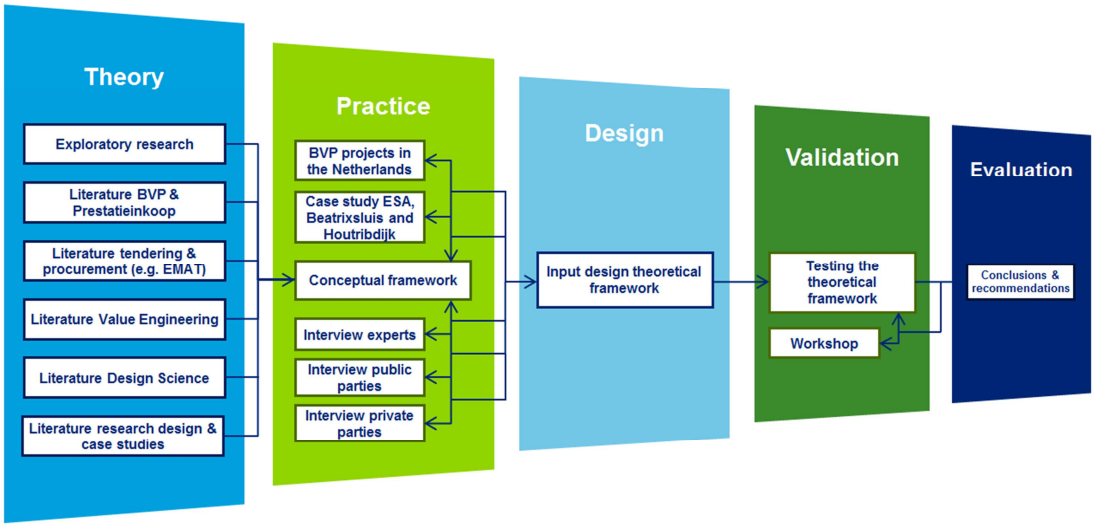

Figure 2-1: phases in the research process

The couplings between the diverse activities shown in in each of the phases are represented with arrows. Each of the phases is described more extensively in the subsequent paragraphs.

2.2.1 Theory

The theoretical phase starts with an exploratory desk research in order to look for possibilities to give direction to the subject of the research. This orientation involves the investigation of several award mechanisms, the public and private parties that are involved and developments in other fields are reviewed. Furthermore, also literature is taken into account on how to design a scientific research and case studies.

When the current state of development has become clear, it is possible to dive into the chosen direction more extensively. Of course, the fundamental literature on the BVP award mechanism is consulted extensively, but also traditional procurement methods and the EMAT award mechanism are studied.

Besides acquiring more knowledge and expertise on the subject of the BVP award mechanism, it is also important to create the necessary depth for the thesis research during the literature study. This can be realised by so-called source triangulation in which several theories are combined. This is adopted by examining a couple of principles, e.g. New Institutional Economics, Value Engineering and Design Science.

During the literature studies the following topics are assessed more extensively that are considered relevant for the execution of this research:

- The Best Value *Procurement* (BVP) award mechanism and its Dutch equivalent Prestatieinkoop serve as the mental legacy for this research. These large bodies of knowledge are supported by the Information Measurement Theory (IMT) and the *Kashiwagi Solution Model* (KSM);
- The *Economically Most Advantages Tender* (EMAT) award mechanism is implemented, because it is also an important aspect in the BVP award mechanism;

- In creating dominantly more Value Added, it is essential to review several theories related to Value Engineering , also in other fields of expertise (e.g. Value Driven Design, Value Oriented Modelling);
- Additional opportunities might be found in increasing the organisations efficiency with the broad studies of *New Institutional Economics* (NIE). In this theory many disciplines are combined (e.g. economy, political science, sociology) to understand the behaviour of social, political and commercial institutions.
- *Transaction Cost Economics* (TCE) is concerned with an aspect of New Institutional economics, which is about the governance of contractual relations, which is in line with the BVP award mechanism;
- The Design Science Information System theory is analysed in order to design a applicable theoretical framework;
- Finally, since the thesis has to meet a sufficient academic level, literature is consulted in which is explained how to properly conduct a scientific research.

In literature studies it is important to know that information is not (always) objective and therefore it must be dealt with critically at all times. The applicability and usefulness of the information depends on how the information is structured and interpret. Therefore, endlessly gathering information will not deliver a satisfactory result.

2.2.2 Practice

The second phase in the research model is concerned with practice. Here, the theory from the previous phase is used as a conceptual framework that will be related to reality. The interaction between theory and practice is executed in an explorative research. This is achieved by comparing the statements from literature with evaluation reports of BVP projects and conducting interviews with BVP experts and employees involved of both public and private parties.

In this phase, the three selected projects (i.e. the Houtribdijk project, the Beatrixsluis project and the ESA project) serve as reference projects for this research and help to obtain the findings and recommendations for the thesis research. The Houtribdijk project officially is the first BVP tendered project which is won by Royal HaskoningDHV. However, the former company DHV already won the tender of the ESA project before the merger between Royal Haskoning and DHV in 2012. Finally, the third project (the Beatrixsluis project) was not awarded to Royal Haskoning or DHV.

In the case studies on the three projects there are conducted face-to-face interviews in order to gather insights about the backgrounds in the motives and decision making of both the client and the vendor. In approaching multiple projects, the findings evolving from the thesis research are not underpinned by only one project. This way the consistency of the conclusions and recommendations will be secured.

Selecting the interviewees is of great importance for this research. Interviews with employees of public parties (e.g. Rijkswaterstaat) and private parties (e.g. Royal HaskoningDHV) might (unconsciously) result in biased information. Therefore it is relevant to conduct interviews with external experts (e.g. Scenter) in the field of BVP as well. Through consulting types of interviewees it is possible to combine the different perspectives for the next phase of the research model.

2.2.3 Design

After the theoretical and practical phases are completed all necessary input has been gathered to start the design of the theoretical framework. The theoretical framework will be designed with the knowledge gained in the interaction between the conceptual framework from theory and the experiences derived from practice. The function of the theoretical framework is to design a practically applicable model that describes possibilities for the business line Rivers, Delta's and Coasts of Royal HaskoningDHV to increase the scores on the award criteria in BVP tender procedures.

It might even be possible that the theoretical framework is applicable for BVP tender procedure in general and other business lines of Royal HaskoningDHV are able to apply this instrument as well.

2.2.4 Validation

Now the theoretical framework is developed it is time to put the theoretical framework to the test. This is done conducting an interactive workshop with the employees of Royal HaskoningDHV. Their expertise is used to validate whether the theoretical framework is actually a useful instrument and also this is an opportunity to fine-tune the model. After the final revision the outcome of this phase is a validated theoretical framework.

2.2.5 Evaluation

Finally, the thesis report is finalized with drawing the final conclusions and recommendations for the future for the business line Rivers, Delta's and Coasts of Royal HaskoningDHV. Besides that, also the process of the graduation research itself are reviewed and the objectives are verified in order to check whether they have been achieved. On the basis hereof, it can be determined whether the results of the project contain the intended relevance and whether the overall project can be called a success.

PART C: THEORETICAL FRAMEWORK

"In theory there is no difference between theory and practice. In practice there is" **– Yogi Berra**

The fundament of the thesis research is captured in the theoretical framework. The essentials of the BV philosophy are explained together with the underlying theories, i.e. the IMT and the KSM. Hereafter, the practical implementation of the BV philosophy is set forth from the client's (BVP) and vendor's perspective (BVS). Finally, the current state of development and the future perspectives of BV are delineated.

3 BEST VALUE PHILOPSOPHY

3.1 Introduction

Approximately fifteen years ago, Dean Kashiwagi started with the development of the BV philosophy. At the *Performance Based Studies Research Group* (PBSRG) on the Arizona State University the *Performance Information Procurement System* (PIPS) or Best Value Procurement (BVP) is developed. Kashiwagi's aim was to improve the procurement and management of construction projects by reducing risks and is focussed at selecting the best available vendor for a project. The BVP award mechanism is based on two underlying theories, i.e. the Information Measurement Theory (IMT) and the Kashiwagi Solution Model (KSM). This chapter solely focuses on the BV philosophy itself, additional information about the underlying theories (IMT and KSM) is found in appendix A. Together these form the basis of the theoretical framework, which serves as a guideline throughout the report in which the fundamental elements of the BV philosophy are explained.

3.2 The paradigm shift

As already mentioned in the introduction most of the procurement methods are focussed at selecting the vendor who is able to deliver the goods or services at the lowest price. In the price based market the *client* minimises the risks by specifications, standards and qualifications based on management and inspection. Besides the price based market, in Figure 3-1 three other types of market are shown. The classification is established in terms of competition and performance in each of these markets.

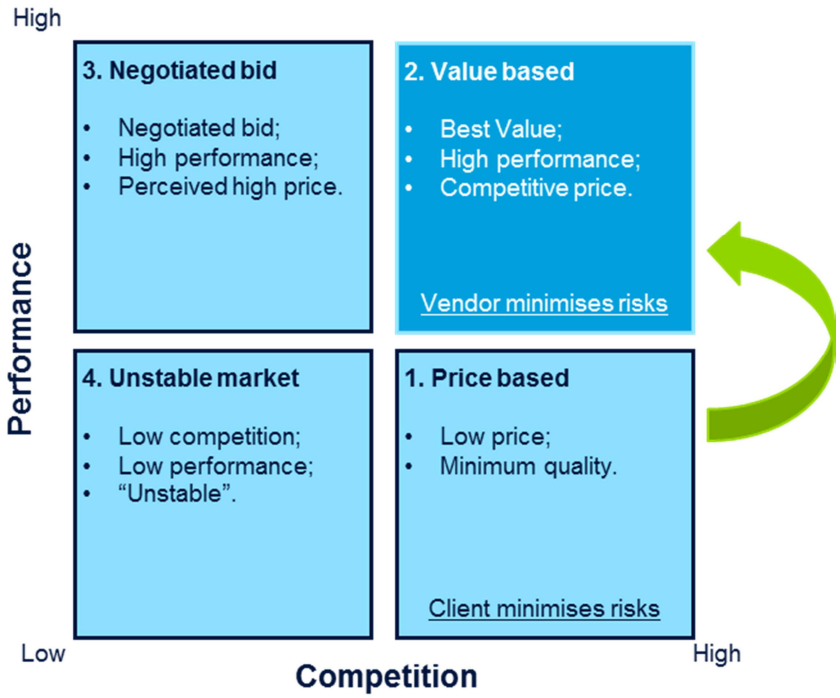

Figure 3-1: paradigm shift (Kashiwagi, 2004)

In the value based market the *vendor* is the one who minimises the risks by performance and price measurements based on quality control using measurable performance indicators (Dutch: meetbare prestatie informatie). In the third quadrant

there is no such thing as competition. The client is not bounded by any legislation on unfair competition and thus is allowed to select the vendor of his choice. Next, the client and the vendor negotiate about the price and the deliverables and the vendor performs what is agreed upon. This results in a high performance, since this market based on customer relations and the vendor wants to be hired for future projects again. The fourth and final market is characterised by low competition and low performance, i.e. the unstable market.

The BV philosophy sets in motion a paradigm shift from a price based market towards a value based market, by which responsibility is transferred from the client to the vendor. In Figure 3-1 the paradigm shift is shown from the lower left right quadrant to the upper right quadrant, which corresponds with an increasing performance while the competition remains the same. The question arises how this increase of performance is achieved without a reduction of the competition? This is explained by means of the effect of defining minimum requirements in price based market, which is illustrated in Figure 3-2.

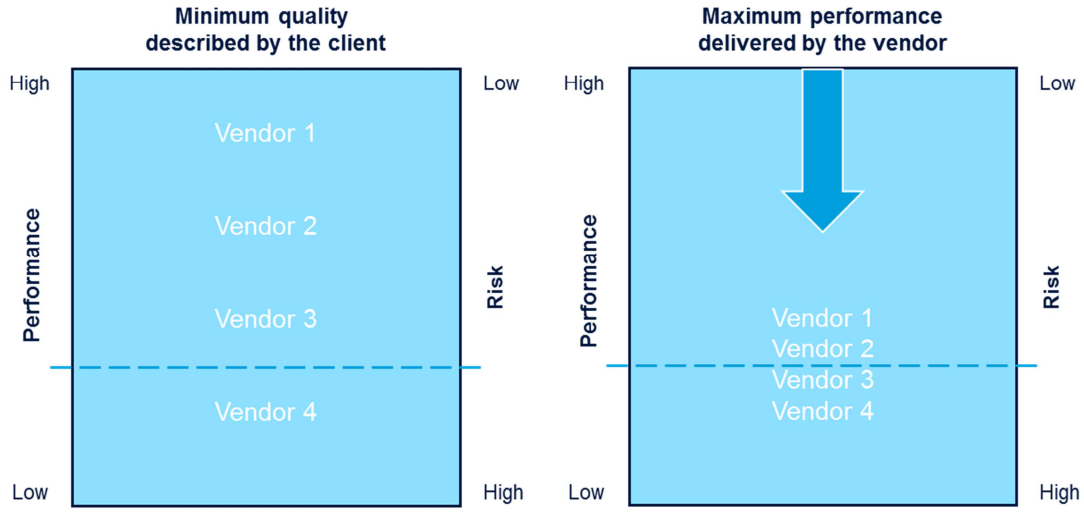

Figure 3-2: the effect of defining minimum requirements by the client.

Traditionally, the client is inclined to prescribe his demands and wishes in detailed requirements and specifications in order to safeguard the quality level of the delivered goods or services. This way, competent vendors will reduce their performance and associated price to the minim standards of the client and incompetent vendors desperately try to accomplish these minim standards. Subsequently, the minimum requirements of the client become the maximum performance that is delivered by the vendors and the only way for vendors to distinguish themselves is on lowest price (see Figure 3-2).

In BV philosophy the client no longer prescribes minimum requirements and publishes a fixed maximum budget instead. As a result, the vendors are challenged to deliver their maximum performance within the available budget and the vendors are the one who determine the quality standards for the project.

3.3 Best Value Procurement

The application of the BV philosophy in the world of procurement is known as the BVP award mechanism. In this thesis the Dutch equivalent of the BVP award mechanism, i.e. Prestatieinkoop, is used as guidance for this is simply the best known in the Netherlands. The ideology in both approaches corresponds entirely, but the application of Prestatieinkoop has been adjusted for practicality reasons. One of these practical differences is further explained in paragraph 3.3.2. The approach of prestatieinkoop consists of four phases, i.e. preparation phase, assessment phase, pre-award phase and the execution phase. These are visualised in the Figure 3-3. On the basis of these phases the procedure of the award mechanism is elaborated. As a consequence of the demarcation of the research, the focus in this report is on the preparation phase and the assessment phase and thus more attention is paid to these phases.

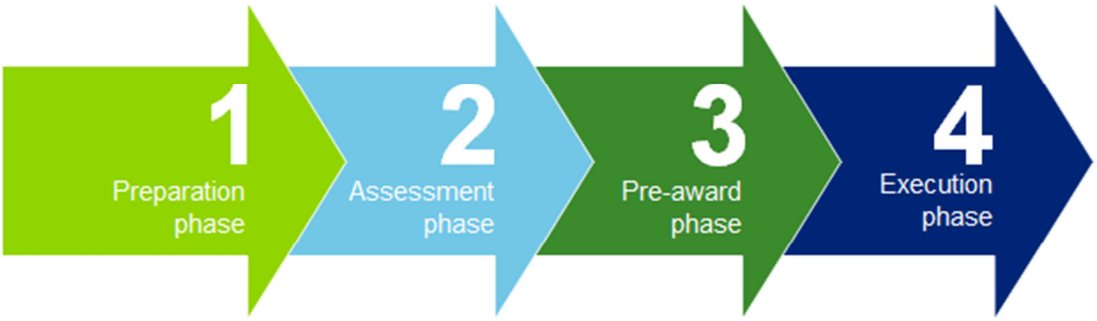

Figure 3-3: phases of Prestatieinkoop.

3.3.1 Phase 1: preparation

A company has come into contact with the BV philosophy and has the ambition to put a project on the market with Prestatieinkoop. Before the company starts with the procurement of a project, first the necessary preparations have to be done to make the organisation ready for the operation. These preliminary works consist of different steps varying from the composition of a BV core team which is responsible for carrying out the tender procedure up to inviting the vendors for the initial meeting. These steps are worked out in more detail hereafter.

Starting point is to collect relevant information about the current situation of the organisation (i.e. status quo). This is an essential step in the preparation phase, since it makes it possible to demonstrate whether the new approach actually is beneficial during the evaluation. This step is known as the demarcation of the strategic framework and contains companywide objectives, e.g. increasing efficiency or reducing transaction costs. Likewise, a company is forced to pay attention to the company's strategy carefully and it is prevented that Prestatieinkoop is applied like an ordinary procurement method.

Hereafter, it is time to select employees to form the BV core team and to familiarise them with the BV philosophy as if it is their second nature. It is essential the employees are comfortable with the philosophy and apply it from their own conviction and not because it is imposed on them from above. Once the team is complete, the BV core team selects a project that is suitable to procure with Prestatieinkoop and together formulate the objectives for the project. Important is that the objectives are formulated at a proper abstraction level. Often clients are inclined to define the objectives with too much detail by the vendor is hampered to show its expertise. The effects hereof are described in the price-based market in paragraph 3.2. The proper abstraction level is

achieved more easily by focussing on what it is one wants as a client, rather than how this has to be achieved. The answer to the how-question is up to the vendors to decide.

Next step is to determine within what period of time the procurement of the project has to be competed. From the initiation up to the official award at the end of the pre-award phase approximately takes four months. It is recommended to take into account some extra time for the procurement of the first project in which Prestatieinkoop is applied. The time required will reduce over time in subsequent projects.

Now the client has to determine the maximum budget that is available for the project. In case this maximum is exceeded by one of the vendors, then this tender is immediately excluded in advance and thus is not taken into account for further assessment. As the budget is settled, the quality criteria are selected and weighted in proportion to the budget. Of course, the client is free to do this to his own discretion, but in an often applied ratio the quality value is 70% of the maximum available budget (see Table 3-1).

Quality criterion	Percentage of the budget
1. Risk Assessment client	15%
2. Risk Assessment vendor	10%
3. Value Added	10%
4. Interviews	30%
5. Planning	5%
Total quality value	**70%**

Table 3-1: example of allocating weights to the quality criteria.

Also in the quality criteria and the allocation of the weights to the quality criteria are up to the client to decide. However, the interviews represent the highest share of the quality criteria, since these offer the best indication of the capabilities of the vendor and thus bring about the largest differences. All information about the tender procedure, project objectives, maximum budget and quality criteria are written down in the tender guide. This is distributed to the vendors in advance.

Finally, the project is put on the market with an announcement and vendors are invited for the initial meeting. In this meeting the client informs the interested parties about (1) the content of the project and (2) the BV philosophy. On behalf of this meeting the vendors decide whether they intend to participate in the procurement of the project or not. For the remaining parties the vendor organises training sessions to familiarise them with the BV philosophy and to adopt the approach of Prestatieinkoop.

3.3.2 Phase 2: assessment

For the assessment of the vendor's subscriptions the client has to determine and announce in advance what method is applied to examine the tenders. In projects that are put on the market with BV the ranking of the tenders can be carried out in two ways. The first method is developed by Dean Kashiwagi in which there are awarded points to prices. The second method is developed CROW and is known as "Gunnen op Waarde" (English: awarding on value). In contrast with Dean Kashiwagi's method, this method expresses the quality criteria in monetary units. Both ranking methods are worked out in more detail in the following.

“Gunnen op Waarde” method

In this method first the quality criteria are converted to a monetary value. In Table 3-1 an example is given of a possible distribution of weights to the separate criteria. Of course, these criteria may differ for every project, but the five listed here are the most commonly used. Secondly, the sum of the monetised value is subtracted from the quality criteria from the subscription price (or bid price). The fictitious subscription price that is obtained this way is written down in formula form in Formula 3-1. Here, the products or services are awarded to the vendor with the lowest fictitious subscription price.

$$Fictitious\ price = Bid\ price - \sum Quality\ criteria\ 1, \dots, n \qquad \textbf{Formula 3-1}$$

When the client has received the subscriptions of all participating vendors, the actual assessment is started. Each of the predetermined quality criteria are awarded with a score on a scale from null to ten. To improve the distinctiveness of the ranking method, only even numbers are assigned to the criteria (e.g. it is easier to explain the difference between scores six and eight than between scores 7,1 and 7,3). Table 3-2 shows in the second column what appreciation matches with every score and in the third column is shown what percentage of the quality value corresponds with each score.

Score	Appreciation	Percentage of the maximum quality value
10	Excellent	+100%
8	Good	+50%
6	Neutral	0%
4	Insufficient	-50%
2	Bad	-100%

Table 3-2: valuation model “Gunnen op Waarde”.

In the final step it is a matter of filling in the variables in the formula and calculate the fictitious price for each tender. The client has acquired a properly substantiated ranking of the various subscriptions and the award decision is communicated to the vendors. The award decision is provided with the scores of all participating vendors and is explanation on the obtained scores for the quality criteria.

Dean Kashiwagi’s method

In the model of Dean Kashiwagi the Linear Relationship Model (LRM) is applied to rank the different subscriptions. The maximum score in the LRM is fixed at one hundred points (100%) and the price and quality share are defined in advance, e.g. the same weights as used in Table 3-1. In this example the maximum score on price is thirty points and the maximum score on the quality criteria is seventy points. Finally, the project is awarded to the vendor whose tender earned the most points.

Similar to the “Gunnen op Waarde” method the client first scores the quality criteria with grades for each vendor individually. Hereafter, the score of the best performing vendor is equated to the maximum score (100%) and the grades of the other vendors are expressed as a percentage of the score of the best performing vendor. For example, when the best score on the interviews is an eight, then this represents the maximum score. In case of the points are distributed as shown in Table 3-1 this corresponds with a score of thirty points. Another vendor who has received a score six on the interviews, subsequently 75% of the maximum score is obtained and 22,5 points are earned. This is

done for all quality criteria and also for the price. Finally, the sum of the parts is calculated to determine the final score.

Additionally, Kashiwagi's model is equipped with a security check also known as the dominance check. This implies that the client has to determine in advance to what extent the bid price of the tender of the BV vendor (number one in the ranking) is allowed to exceed the bid price of number two in the ranking. If this range, often set at ten per cent, is exceeded the vendor has to prove to the client with dominant information why this limit is crossed. If this cannot be sufficiently demonstrated the client joins forces with second best vendor. The same applies to the bid price of the BV vendor that is over ten per cent smaller than the average bid price.

Back to the general part of the assessment, after the anonymous assessment of the tender documents, the client invites all vendors that are not excluded on beforehand for the interviews. During the interviews the assessment team of client is acquainted with what tender documents belong to which vendor, but the bid price still remains unrevealed. Usually, the interviews are conducted with two or three employees of each vendor. These key figures (Dutch: sleutelfunctionarissen) are all assed with the exact same questionnaire that has been prepared in advance. During the interviews each key figure is questioned by one and the same member of the assessment team of the client. The other members of the assessment team are also present during the interview, but do not participate in the interview.

In the end of the assessment phase, the client calculates the final scores and substantiates the scores with an explanation. In the announcement of the award decision the best available vendor is revealed. This officious award of the project is published to each vendor personally by letter. The scores of all vendors are revealed to all participants, but the explanation on the scores for the quality criteria are only for every vendor individually.

3.3.3 Phase 3: pre-award

With the announcement of the best available vendor and the start of the pre-award phase, the best available vendor takes over the lead of the client. The pre-award phase (Dutch: concretiseringsfase) is considered as the most important phase of Prestatieinkoop. Now, the time has come for the vendor to put the proposed plans into action. The pre-award starts with the official kick-off meeting in which both the team of the client and the vendor participate.

During the pre-award the vendor plans the project from beginning to end and all risks and opportunities are identified, performance indicators (Dutch: prestatieindicatoren) are determined and important milestones are appointed. Furthermore, the pre-award is often used to make the stakeholder inventory complete and align the different point of views of the parties involved regarding the project.

Immediately from the beginning, the vendor informs the client every week with an update on the progress, which is recorded in the weekly reports (WR's). In these weekly's all risks and opportunities are included that have occurred and affect one of the project's objectives. The client scores the mitigations that are taken by the vendor in the WR with a client satisfactory score, which indicate the satisfaction of the client about the way the vendor safeguards the project objectives.

At the end of the pre-award phase both client and vendor decide whether they want to continue with each other for the rest of the project. As both parties are convinced together the project can be completed successfully, the pre-award phase is finalised with the official award of the project and the concluding the contract.

3.3.4 Phase 4: execution phase

As the project now is officially awarded, the best available vendor is assured with the implementation of the project and the execution phase is started. Actually, there do not occur that many changes as the vendor already started with the execution of the project in the pre-award phase. The vendor continues with doing at what he is best, i.e. showing his expertise and live up to the agreed performances as described in the subscription.

3.4 Best Value Sales

Such as BVP is the application of the BV philosophy for the procurement of projects, as is *Best Value Sales* (BVS) the application of the BV philosophy for the sales of projects. Although, Dean Kashiwagi has not published an international book about BVS yet, in the Netherlands the counterpart of Prestatieinkoop is published recently. In May 2013 the book “Prestatieverkoop: klanten winnen met Best Value” (Verheul, Rydell, & Santema, 2013) is issued.

As this report approaches BV from the vendor’s perspective, it has to be mentioned that it is actually focussed on BVS or Prestatieverkoop rather than BVP or Prestatieinkoop. When, in a particular context it is about the BV philosophy in general, then this is simply allude to as Best Value (BV). In order to prevent confusion there is only referred to BVP (Prestatieinkoop) or BVS (Prestatieverkoop) when this is meant explicitly.

In Figure 3-4 the different phases of Prestatieverkoop are mentioned. It is immediately noticed that unlike Prestatieinkoop this process consists of three instead of four phases. Actually, the process of Prestatieverkoop entails four phases as well, since the realisation phase of the vendor coincides with the pre-award phase and the execution phase of the client. The reason why these phases are approached separately for the client and jointly for the vendor is explained in the following.

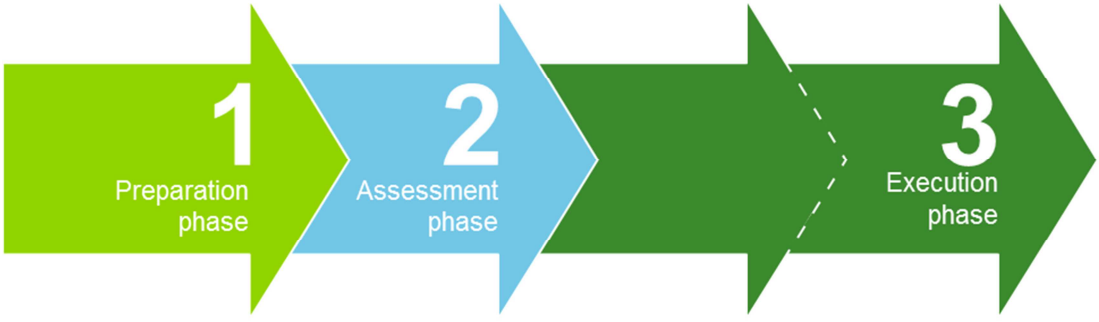

Figure 3-4: phases of Prestatieverkoop.

After the officious award of the project at the end of the second phase, the vendor takes the lead and starts with the realisation of the project on the one hand. This starts with the pre-award phase (Dutch: concretiseringsfase) in which the vendor demonstrates the client that he is capable to execute the proposed in the subscription phase. Until the end of the pre-award phase the client is still legally authorised to resign the vendor from the project and to start the pre-award phase again with vendor number two. However, the

vendor is not focussed at proving the client he is best suitable for the job once more. Instead, the vendor's attention is fixed at the realisation of the project and he is already started with the first steps of the implementation. This way the vendor shows to the client he acts in the best interest of the entire supply chain and subsequently the project will automatically be awarded officially at the end of the pre-award.

3.5 Future of BV in the Netherlands

The first results of projects that are tendered with BV have been experienced as a pleasant acquaintance, with project completion within budget and time. The future course of BV in the Netherlands is highly dependent on the continuation of these successes in practice. BV projects have carried on delivering satisfactory result for both the client and the vendor. When BV structurally does not deliver desired results for one of the parties involved, it is likely that clients no longer apply BVP as an award mechanism and vendors will no longer apply BVS to approach BVP tenders or even will not subscribe for BV projects anymore.

Apparently, both parties are content with the approach as the number of BV projects increases over time. In Figure 3-5 the number of projects tendered with the BVP award mechanism is shown for the period from 2008 to 2013. The upward trend seems to be interrupted in the year 2013, but this is due to the fact that the data on which this graph is based dates from December 2012 and not all BV projects are known at that time. Figure 3-5 shows the total number of projects awarded with BVP in the Netherlands and disaggregates these in services (versus the goods) and hydraulic projects (versus other construction projects).

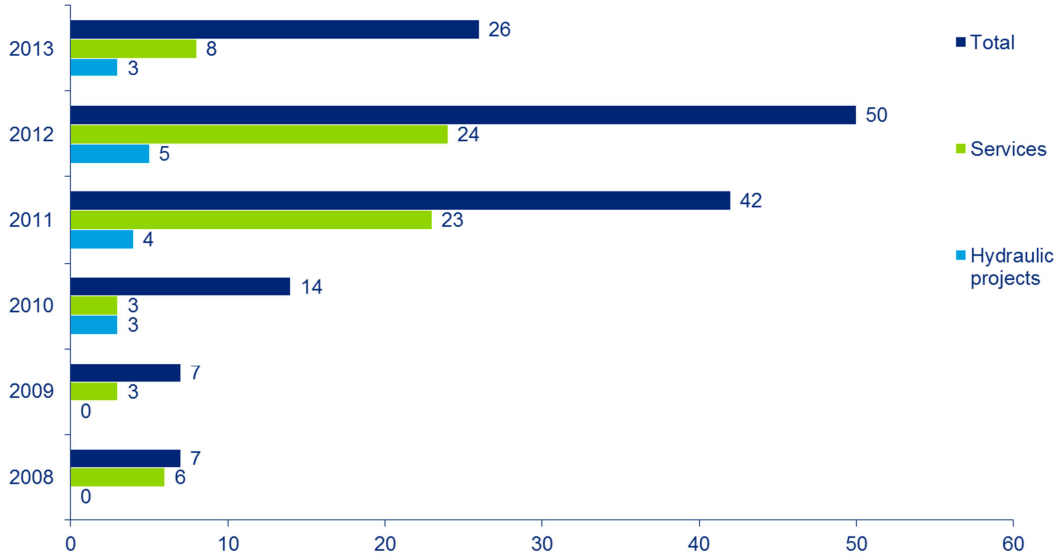

Figure 3-5: BVP tenders in the Netherlands. (Pianoo Expertisecentrum, 2012)

As Rijkswaterstaat is the primary client in the construction industry, it is important to know their future plans with the BV philosophy. Also Rijkswaterstaat has experienced positive the results of BV in the emergency approach. But what are the future plans of Rijkswaterstaat with BV? Rijkswaterstaat has developed a strategic plan for the short term (i.e. 2013-1015) and the long term (i.e. 2015 and beyond). In the near future, the projects in progress are examined after completion and in 2015 the balance sheet is drawn up. Of course the plans for 2015 onwards depend on the results of the evaluation

of the current projects, but Rijkswaterstaat has the intention to implement BV as more generic form of procurement.

In the meantime Rijkswaterstaat has the ambition to put the top five engineering projects on the market with the BVP award mechanism every year up until 2015. Besides that, the goal is also to tender three to five D&C contracts with the BVP award mechanism. Furthermore, the current knowledge of BVP within Rijkswaterstaat is still concentrated in the BVP core team and the aim is to spread the knowledge throughout the entire organisation. This way, more employees are able to work with BV and Rijkswaterstaat prepares itself to put more and more projects on the market with BV in the future. (Brandsen, 2013)

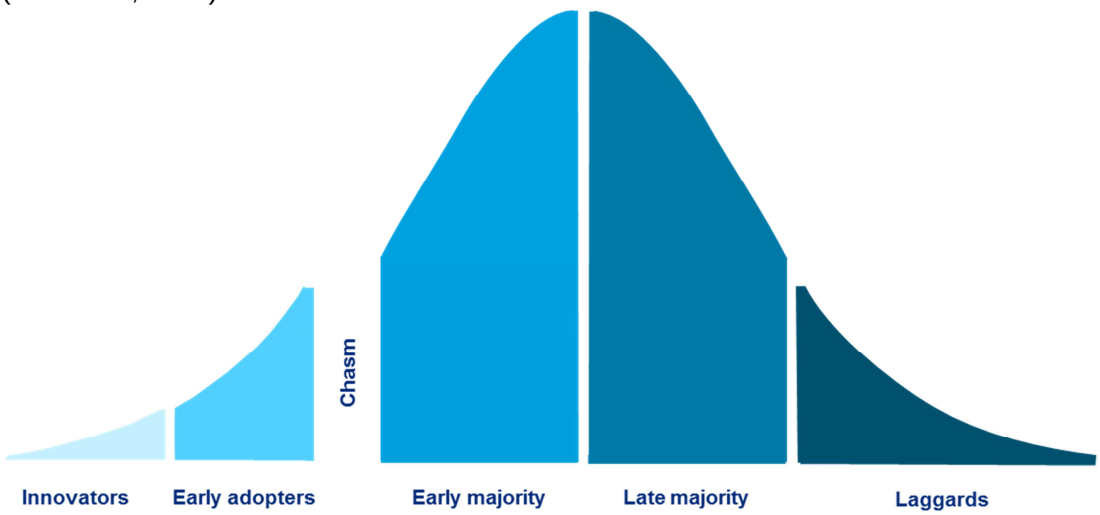

Figure 3-6: crossing the chasm (Moore, 1999)

With Rijkswaterstaat up front as one of the innovators of BVP in the Dutch construction industry, the number of clients that put projects on the market with BV is ever increasing. Rijkswaterstaat is considered as one of the innovators in the Netherlands, since they recognised the potential of the BV philosophy and had the courage to test the pudding (see Figure 3-6). The early adopter are characterised as pragmatics who want to see the philosophy earn its spurs first before they apply it themselves. Early adopters of BV and are found in the public sector (lower governmental bodies, e.g. provinces, water boards and municipalities) and in private sector (e.g. contractors contracting sub-contractors). However, also in other branches BVP is implemented progressively, e.g. IT-services, steal industry and hospitals. (Pianoo Expertisecentrum, 2012) The large majority of BVP projects are applied in the public sector and in order to cross the chasm the BV philosophy also has to gain ground in the private sector. (Moore, 1999)

The first step in crossing the chasm for BVP is the recent development of the BVS. As market parties notice the BV philosophy is winning terrain, the interest increases for vendors to gain experience with the BVS. This way the development of BVS follows in the wake of BVP and is currently still found in the early adopter phase. Also Royal HaskoningDHV is considered to be among the early adopters of BVS. Although the ranking in projects that are tendered with the BV award mechanism still have room for improvement, it is seen that Royal HaskoningDHV already leaves the majority of its competitors behind and is only outranked by a few. (Rijkswaterstaat, 2010b) (Rijkswaterstaat, 2012c) (Rijkswaterstaat, 2012d) The demonstration hereof is elaborated more extensively in the case study. Besides that, Royal HaskoningDHV also

operates on the procurement side of BV in assisting clients with putting their projects on the market with the BVP award mechanism. This way, they participate in BV projects on both the client and the vendor side and the knowledge gained in BVS projects can be applied in BVP projects and vice versa.

3.6 Reflection

3.6.1 Best Value

At first glance the BVP award mechanism is often seen as just another fancy procurement process to help the client select a vendor. It must be admitted that various procurement methods have passed in the meanwhile, which explains this primary reaction. However, when one is willing to open up to make the BV mind-set one's own, one will realise BV truly is a philosophy or 'a way of life'. But what actually is the BV philosophy? Probably, this is the question that is most difficult to answer, because there is not one straight-forward answer that is correct.

During the BV congress in May 2013, this question is also discussed frequently. At the end of the second day several quotes are put forward in the concluding presentation of the congress. In Figure 3-7 six of these quotes are shown. The diversity of the answers illustrates that there the BV philosophy is interpreted in different ways. Therefore, it is of importance to ask yourself what the BV philosophy means for you personally.

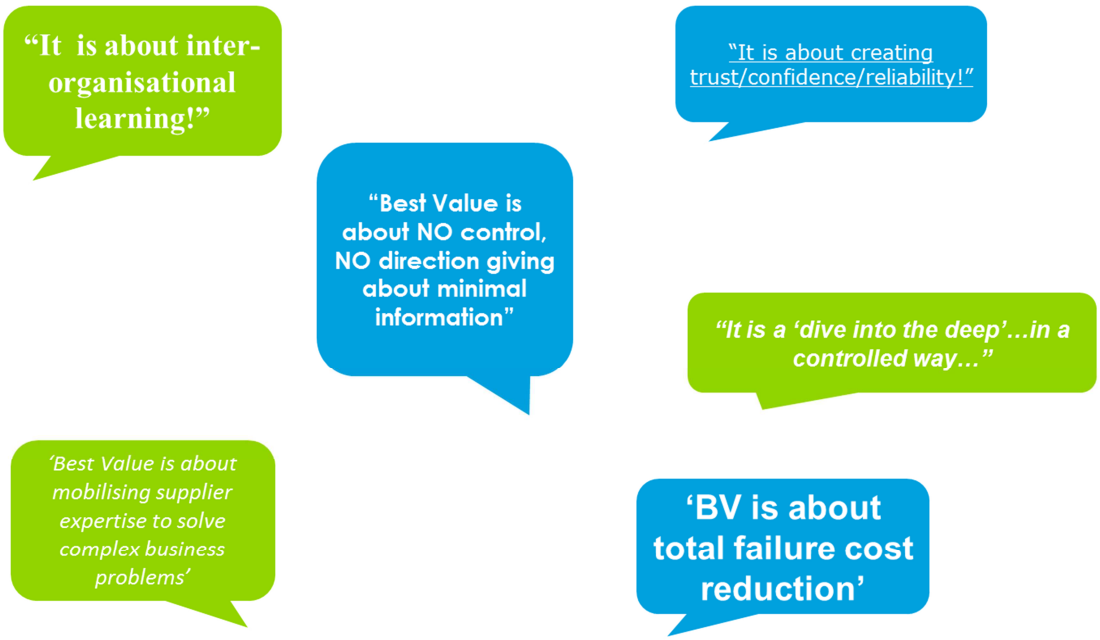

Figure 3-7: quotes during the BV congress, May 2013. (Weele, 2013)

To me the BV philosophy is about the optimisation of the entire supply chain instead of the optimisation of the individual link in the supply chain. Transcend the walls of the silos in the supply chain; think in the best interest of the client; make the client's objectives your own objectives; do even more than others expect of you; amaze others around you and others will amaze you too. Although, this reflection tends to enter the field of ethics, it covers the load best of my personal view on the BV philosophy.

3.6.2 IMT

An often heard critical sound on behalf of the IMT is concerned with the event. It is agreed that every event has initial and final conditions and that the natural laws are and always will be present during the event. However, the crux that many people experience is that the IMT states that every event only has one possible outcome and so the final outcome can be determined in advance. Instead, it is put forward that the event (or project) is subject to influences that are not known on beforehand. (Ledden, 2013) (Hillen, 2013) These contingencies or 'unknown unknowns' during an event, illustrated in Figure 3-8, cause the project to have multiple outcomes that cannot be predicted on beforehand.

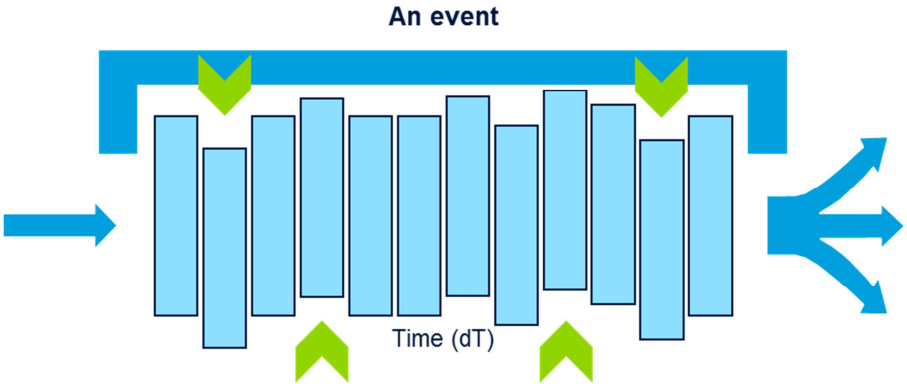

Figure 3-8: an event with contingencies.

In the BV literature this dilemma is countered by the IMT itself. Kashiwagi states that the visionary persons (type A) are able to see into the future and thus can identify all these contingencies. The non-visionaries or those who cannot see (type C people) are unable to look into the future and thus see multiple outcomes. Of course, it is true that when *all* information is acquired in advance, the event can only happen in one way. On the one hand this defence is quite solid, but on the other hand this purely theoretical approach seems self-sustaining and in practise it appears to be a mission impossible to acquire *all* information. Hence, after all the IMT remains part of a vision and its aim is to make people think about its essence, which is done in the following.

An example of such a contingency is the influence of a change in the political climate on the project. The nature of these contingencies often is outside the scope of the vendor and thus the consequences of these contingencies are on the account of the client. With that, this does not imply that a contingency like this is not a concern for the vendor. Precisely the opposite is true, since the BV vendor always acts in the best interest of the client. One of the best Dutch football players of all times once stated:

"Every disadvantage has its advantage". (Dutch: Ieder nadeel, heb z'n voordeel") – Johan Cruijff

Reflected on the matter discussed here, this statement illustrates that with every contingency also comes an opportunity and stimulates to create strengths out of weaknesses. Back to the example: although, it is not within the power of the vendor to influence the outcome of contingencies (e.g. political decision), it is within the power of the vendor to identify the contingency and to mitigate or even exploit the contingency. A visionary vendor always looks for the opportunities in every risk and this is exactly what

discerns the visionary people from the ‘blind’ people. Vendors have to focus on the things they can do, rather than focus on the things they cannot do.

3.6.3 KSM

Although part of the BV philosophy, the KSM is not an as well-known part of the philosophy as the IMT is. However, the principles that are put forward are interwoven in the entire theory and likewise most people are familiar with the principle without knowing this is part of the KSM. At first sight the KSM is merely seen a method to set forth the desired attitude that is required to act in a BV way. The two types of people that are described are the exact opposites of one other and it is as if the ‘type A’ person represents everything that is good and the ‘type C’ person represents everything that is wrong. Of course, everybody wants to identify themselves with the ‘type A’ person and this way the KSM is not a practical method to classify individuals. Moreover, the KSM is interpreted as the representation of the totality of values that are carried out with the BV philosophy.

During one of the tracks on the BV congress 2013 in Delft, Dean Kashiwagi elaborated on the IMT in more detail. Here, while talking the discussion ended up on the edge between the IMT with the KSM. The statement Kashiwagi made is concerned with his own processing speed compared to that of his son, Jacob Kashiwagi. Dean Kashiwagi stated that his son has a much higher processing than himself, simply because Jacob already knows so much more than Dean himself at the same age.

> “*I knew only ten per cent of what he knows at this age*”, Dean Kashiwagi at the Best Value Congress in Delft (May 2013).

In my opinion it is questionable whether this statement of Kashiwagi has anything to do with processing speed. Instead, I think this is a more matter of the number of natural laws (e.g. the IMT and the KSM) that have been discovered at particular moment in time. For example, back in the days Dean Kashiwagi ‘discovered’ the KSM and the IMT himself and today Jacob Kashiwagi can take these natural laws for granted. The processing speed is a quantity that expresses a person’s capability to move along the cycle of learning (i.e. perceive, process, apply and change information). The availability of information on a certain moment in time does not affect this in any way.

PART D: THE CASE STUDY

***"It is beyond a doubt that all our knowledge begins with experience."* – Immanuel Kant**

The practical phase of the research process coincides in the case study. The case study consists of three BV projects in which both Royal Haskoning and DHV have participated. After a short introduction of these projects, the performances of both vendors are put under the microscope. Hereafter, it is investigated how these performances have come about by evaluating the tender assessments of Rijkswaterstaat and conducting interviews with employees that participated in these projects.

PART E: TOWARDS THE BEST VALUE VENDOR

***"A satisfied customer is the best business strategy of all."* – Michael LeBoeuf**

As SMART formulation has been indicated as the most important point of attention by both client and vendor the design phase starts with the development of a SMART assessment tool. This is the first step in compositing the BV tender. In order to become the BV organisation there is zoomed in on three levels of the organisation, i.e. the BV support team, the BV tender team and the BV individual.

7 THE BEST VALUE TENDER

7.1 Introduction

In the tender assessments and in the interviews conducted in the case study, it has come forward SMART formulation is one of the main pitfalls in the composition of the tender documents. Since both client and vendor acknowledge this as an important point for improvement, this chapter elaborates on the SMART conditions for the assessment of the tender documents.

SMART conditions are applied in several industries for many purposes. Subsequently, there are found various abbreviations for the SMART acronym. For example, in an article on software engineering the following variations of the abbreviation are found, i.e. Significant, Motivational, Achievable, Reasonable and Traceable (Mannion & Keepence, 1995). In the latest edition of the book “Prestatieinkoop - met Best Value naar succesvolle projecten” (Rijt & Santema, 2013) the following abbreviation is found: Specific, Measurable, Ambitious, Realistic and Time-bound.

This chapter is about assessing the BV tender documents on behalf of the SMART conditions. Therefore it would be evident (in relation with consistency and unambiguity) to apply the same abbreviation as suggested in BV related literature (i.e. Prestatieinkoop). However, it is chosen to deviate from this interpretation since the conditions used in this abbreviation are too much alike or cannot be appointed to the tender documents straightforward. Hence, for the assessment of the tender documents of the Beatrix lock system on SMART conditions, the following interpretation of the acronym is applied here.

1. **S**pecific;
2. **M**easurable;
3. **A**ttainable;
4. **R**elevant;
5. **T**ime-bound.

7.2 SMART conditions

Both client and contractor address the SMART formulation of the tender documents as an important aspect with potential for improvement. Although, it is put forward frequently, the true meaning of this often used term is not entirely clear to everyone. The apparent insufficient knowledge on how to be SMART in defining tender documents and in interviews is one of the reasons why this term is often mentioned in tender evaluations. In order to create clarity on what is understood by the SMART conditions in the assessment of the tender documents, this is elaborated in the following paragraphs.

7.2.1 Condition 1: Specific

It is often thought that specific is about describing the mitigation or exploitation at a low abstract level or about informing the client in about (technical) details. But, this is not where specific is about. Too detailed information is irrelevant for the client in the assessment of the tender documents. The client is not interested in how the vendor aims to achieve his proposal, the client is interested in what to expect from the vendor. Specific

is about the what-question in order to make clear what measures are undertaken in order to mitigate the risk or to exploit the opportunity.

Though, which aspects contribute to focus on the 'what' of the mitigations and exploitations? First of all extra attention has to be paid to a clear formulation of measures to prevent ambiguity and multiple interpretations. It is also of importance to be consistent in the use of terminology throughout the tender documents. A simple example: do not use the terms 'vendor' and 'contractor' interchangeably, but use one of them instead. (Mannion & Keepence, 1995)

7.2.2 Condition 2: Measurable

In the assessment of the mitigations and exploitations two aspects are taken into account regarding the measurability. First, there is ascertained whether the measures are accompanied with metrics, i.e. the correct quantity and its associated unit. Adding figures and units to each measure makes it possible to verify whether or not each of the measures has been accomplished and to obtain a picture of the vendor's experience. The latter is concerned with the second aspect of the measurability, which is concerned with demonstration of each measure.

Demonstrating and underpinning a mitigation or an exploitation is done with measureable performance information (Dutch: *meetbare prestatie informatie*), which indicates the vendor's experience with the particular measure in previous projects. Here, at times indistinctness arises over the nature of the experience, i.e. (1) the experience of the involved key figures or (2) the experience of the entire company. Both types of measurable performance information are relevant for the client and thus vendors are allowed to apply one of these underpinnings to make each mitigation and exploitation measurable.

7.2.3 Condition 3: Attainable

The third condition can be interpreted in two ways. At first sight attainability is understood as the practicality of the measures, i.e. is the vendor able to execute the proposed action? Yet, this question is mostly answered plausible, since the vendor is not likely to offer a measure that cannot be lived up to. The second interpretation of the attainability of a measure is defined in line with the feasibility of the measure, e.g. is the mitigation sufficient to prevent the risk from happening? Or is this opportunity ensured with this exploitation? The latter interpretation of attainable tends to be more related to effectiveness of the measure. In the SMART assessment the attainability is applied in the sense of the effectiveness of the measure. (Mannion & Keepence, 1995)

7.2.4 Condition 4: Relevance

This condition is associated with the project objectives described by the client. The mitigation of a risk or the exploitation of an opportunity, defined by the vendor, always has to be coupled to at least one of the project objectives. Reason for this is that a risk that does not affect one of the client's objectives, it simply is not a risk for the project. Similarly, an opportunity that does not contribute to one of the client's objectives

is no opportunity for the project.

Elaborated on the link with the project objectives, the rank of the objectives and the risks or opportunities has also been taken into account. When, for example, a risk is concerned with the first (and most important) direct project objective of the client, but is indicated as the last (and least important) risk by the vendor, then the interpretation of the vendor and the client do not correspond. Whenever this might occur, points are subtracted.

Besides the couplings with the projects objectives, the relevance is also concerned with the abstraction level at which the mitigation or exploitation is defined. As mentioned before in paragraph 7.2.1 the client is not interested in too detailed (technical) information. The client expects that the vendor is an expert and thus knows best how to accomplish these measures. Concerning the relevance, the client is interested in the *why*-question instead, i.e. why is a particular measure adequate to mitigate a risk or to exploit an opportunity?

7.2.5 Condition 5: Time-bound

Needless to say the final criterion is concerned with time. If a measure is related to a risk or opportunity that affects the schedule of the project, then the delay or acceleration has to be mentioned explicitly. Besides that, it is possible a measure does not affect the premise time, but the measure does contain a phase of the project or the duration of an action that has to be executed. In that case, the associated period of time also has to be added to the measure to make sure the time-bound condition is met. This could be subsumed under as the when-question.

It is conceivable that a particular measure is does not affect a time-bound objective of the client, nor contains any other time-bound aspects. Subsequently, the time-bound condition is simply not applicable for the measure at stake. In that case, the measure is awarded with a score one to prevent the average score of the concerned measure declines without a valid reason.

7.3 Put the tender to the test

Now a general applicable definition is obtained for each of the five SMART conditions, it is time to assess one of the tenders of the case study. The tender that is put to the test is the tender of Royal Haskoning for the application of the project concerned with the third lock for the Beatrix lock system are assessed on the SMART conditions.

In the assessment the three tender documents are assessed, i.e. the risk assessment (Dutch: risicodossier) for (1) client and (2) vendor, and (3) the value added (Dutch: kansendossier) are evaluated on behalf of the SMART conditions. To be more specific, the mitigations of risks and the exploitations of opportunities are the parts of the tender documents that are focused on and not the risks that are defined. This is the final step in composing the tender documents and this is what the client is interested in. The expert vendor does not distinguish himself from competing vendors by the risks and opportunities he defines, but by showing the best capabilities to manage the defined risks and opportunities. The actual assessments in which the three tender documents are put to the test are found in appendix F.

But, before the assessment starts, a method has to be developed with which these qualitative conditions can be quantified. Hence, first there is elaborated on defining a scale to make the SMART conditions measurable for the assessment and there is explained how the assessments has to be interpreted.

7.3.1 Defining a scale

Distance is measured in miles or kilometres and temperature in degrees Celsius or Fahrenheit. But how to measure SMART conditions of the mitigations and exploitations in the RaVa-plan? In order make the SMART conditions measurable an empirical system has to be mapped on a mathematical system. This is done with the introduction of a scale. A scale consists of a minimum and a maximum value and makes it possible to apply mathematical operations on the obtained numbers. Likewise, these metrics can be used to underpin measures in future tenders. (Gunsteren & Binnekamp, 2011)

It is often heard that measurement of quality criteria, like SMART conditions, are all that subjective. Indeed, that remark is entirely true, since preference measuring preferences is by definition subjective, because the underlying system of the measurement is dependent on the person. The solution for the subjectivity is found in objectivity by multi subjectivity (Verheul, Rydell, & Santema, 2013), but this has not been applied for the upcoming assessment. Therefore it must be kept in mind the granted scores are subjective and probably vary from the scores someone else assigns.

Alike the tender assessment of Rijkswaterstaat, the SMART assessment is done on a scale from null to ten. Since there are five SMART conditions, this implies there is a maximum of two points to be earned for each of the five conditions (i.e. specific, measurable, attainable, relevant and time-bound). When a measure is awarded with the maximum score on every SMART condition, then the total of ten points (100% score) is achieved. This is illustrated in the SMART pie chart in Figure 7-1.

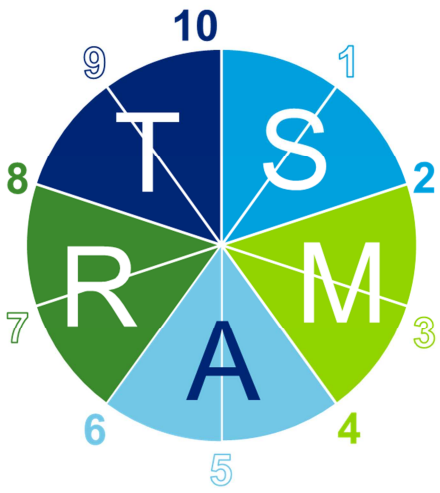

Figure 7-1: SMART assessment tool with the maximum 100% SMART score (10/10).

Each of the five conditions in the pie chart is already elaborated in paragraph 7.2 and serves as the basis for the empirical system of the SMART formulation. Every condition is assessed separately on a scale from null to two, in which null corresponds with a bad and two with an excellent appreciation. A score one resembles a neutral appreciation or is not applicable (N.A.) for a particular measure. This is shown in Table 7-2 for the condition 'specific'. Successively, there is created a scale that maps the empirical system on a mathematical system and calculation can be performed, e.g. adding up the separate scores on every condition to determine the total SMART score on each measure.

Example condition 'specific'	Appreciation	Score
Not specific	Bad	0
Rather specific	Neutral / N.A.	1
Specific	Excellent	2

Table 7-1: mapping an empirical system on a mathematical system.

In Figure 7-2: visualisation of the mathematical system for the condition 'specific'. Figure 7-2 it is shown how the scores on the condition 'specific' are visualised in the SMART assessment in appendix F. When a mitigation is rated as not specific, it receives a score null and the entire slice of the condition specific is left uncoloured. A mitigation that is rated neutral (or is considered not applicable) is rewarded with a score one and the half the slice is coloured (here: light blue). Finally, when a mitigation is rated as specific the full score of two points are awarded and the entire slice is coloured (here: bright blue). Note that besides colouring the slices, also the darkness of the slices increases with the scores. This visualisation is also applied for the other four conditions, of course using different colours.

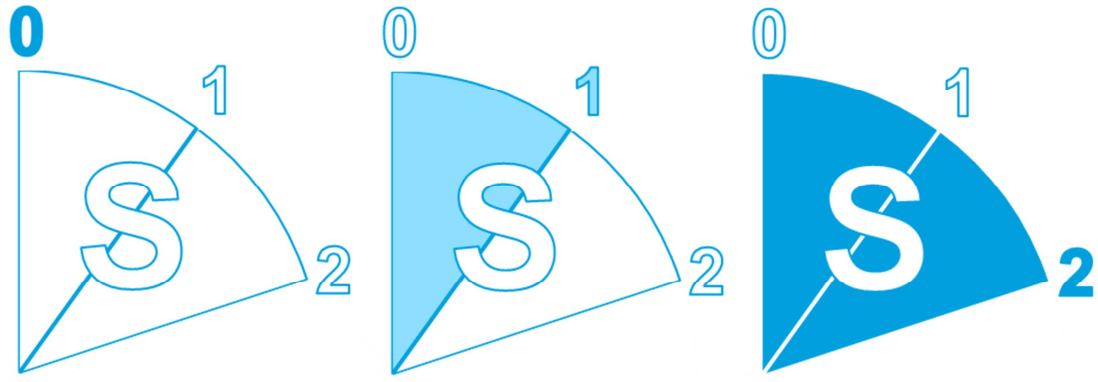

Figure 7-2: visualisation of the mathematical system for the condition 'specific'.

In the first column of the SMART assessment the project objectives are listed, which are defined by the client himself. Here, the direct project objectives (Dutch: opdrachtdoelstelling) and the indirect project objectives (Dutch: projectdoelstellingen) are clearly separated from one other. The second column entails the risks tender document composed by the vendor (here: Royal Haskoning), including both the risk (or opportunity) and mitigation (or: exploitation). The third column entails the SMART conditions, which are indicated with the scores and corresponding colours. In each of the five sub columns the actual assessment of the measures is performed.

7.4 Change for the better

In the SMART assessment the original mitigations and exploitations defined by the tender team of Royal Haskoning are scored for the five conditions and an explanation is given to substantiate these scores. This paragraph elaborates on these comments and defines suggestion to illustrate how the measures are formulated in a more SMART way. In appendix G the original tender documents of Royal Haskoning for the subscription of the project concerned with the Beatrix lock system are changed for the better.

In this appendix the three tender documents are redefined, in succession the risk assessment client, risk assessment vendor and the value added. First, the original formulation of the measure is exposed together with the associated SMART pie chart. Below the original formulation, the suggested formulation is given, accompanied with the new acquired SMART score. The numbering of the mitigations and exploitations corresponds to those in the original tender documents.

7.5 Reflection

In the previous paragraphs the tender documents of the Beatrix lock project are put to the test and suggestions are made for the improvement of the tender documents. Likewise, now there are two versions of the tender documents of the Beatrix lock project, i.e. the original documents of Royal Haskoning and the suggested documents for the improvement of the SMART formulation. Now, it is time to compare these two with one other in order to investigate what the strengths and weaknesses are, how to improve the weaknesses and how to make the strengths even stronger.

Since there is introduced a scale to measure the SMART-ness of the measures, it is allowed to perform calculations with the obtained numbers. First, this is done for the original tender documents (before), secondly for the suggested tender documents (after) and finally there is drawn a parallel between these two.

7.5.1 Original formulation

Table 7-2 shows the average scores on every single SMART condition for each mitigation (or exploitation) in the three tender documents of the Beatrix lock project. The SMART conditions are listed horizontally and the tender documents are listed vertically. The columns below each condition are subdivided into two separate columns, in which the left column lists the average score of the tender document on every single SMART condition (indicated as the average score X out of the maximum score of two). In the right column the average scores are expressed as percentage of the maximum score. In the most left column the overall SMART score is calculated for every tender document

and in the bottom row the weighted average per for each condition is determined.

Document	Specific		Measurable		Attainable		Relevant		Time-bound	
	X / 2	[%]	X / 2	[%]	X / 2	[%]	X / 2	[%]	X / 2	[%]
1. RA client	1,33	**66,5**	0,22	**11,1**	1,22	**61,1**	1,67	**83,3**	1,0	**50,0**
2. RA vendor	1,28	**64,0**	0,71	**35,7**	1,14	**57,1**	1,57	**78,6**	0,57	**28,6**
3. VA	0,33	**16,7**	0,33	**16,7**	0,00	**0,0**	0,33	**16,7**	1,0	**50,0**
Weighted Average	1,15	**57,7**	0,42	**20,9**	1,00	**50,0**	1,42	**71,1**	0,84	**42,1**

Table 7-2: average SMART scores of the original Beatrix lock tender documents.

What do the scores in Table 7-2 actually tell? Again, the condition 'specific' is taken as an example. It is seen that the two risk assessments (client and vendor) score approximately the same, but that the value added document is rewarded with a much lower grade. This is the document to blame for the lower score on the weighted average. It has to be noted that the weighted average is calculated by adding up the separate condition scores for each measure, divided by the total number of measures.

For each tender document the performance on the SMART conditions are indicated and the weighted average represents the scores of the entire proposal. In Table 7-3 the lowest and highest scoring conditions are derived from Table 7-2 and the overall SMART scores are expressed in the most right column. Apparently, the measurability is the biggest pitfall in the SMART formulation in the proposal of Royal Haskoning for the Beatrix lock project. The least difficulties are experienced with the relevancy, since this is the highest scoring condition in the assessment. With an overall SMART score of 48,4% the proposal of Royal Haskoning for the Beatrix lock project meets approximately half the points which could have been acquired in the SMART assessment.

Document	Lowest scoring condition	Highest scoring condition	Overall SMART score	
			X/10	[%]
1. RA client	Measurable	Relevant	5,44	**54,4**
2. RA vendor	Time-bound	Relevant	5,29	**52,9**
3. VA	Attainability	Time-bound	2,00	**20,0**
Weighted Average	**Measurable**	**Relevant**	**4,84**	**48,4**

Table 7-3: interpretation of the SMART assessment of the original measures.

7.5.2 Suggested formulation

In appendix G the suggestions are formulated in order to show in how the mitigations and exploitations can be defined in a more SMART way. Of course, also these suggested improvements are graded in order to indicate to what extent these suggestions bring about more SMART formulation of the measures. In Table 7-4 the average scores of the suggested formulation of tender documents are shown. The table is interpreted in the same manner as Table 7-2.

Document	Specific		Measurable		Attainable		Relevant		Time-bound	
	X / 2	[%]	X / 2	[%]	X / 2	[%]	X / 2	[%]	X / 2	[%]
1. RA client	1,78	**88,9**	2,00	**100**	1,67	**83,3**	1,89	**94,4**	1,44	**72,2**
2. RA vendor	2,00	**100**	2,00	**100**	1,71	**85,7**	2,00	**100**	2,00	**100**
3. VA	2,00	**100**	2,00	**100**	1,67	**83,3**	1,33	**66,7**	1,67	**83,3**
Weighted Average	1,90	**94,8**	2,00	**100**	1,68	**84,1**	1,84	**92,1**	1,68	**84,1**

Table 7-4: average SMART scores of the suggested Beatrix lock tender documents.

Remarkably, the scores of the suggested measures are not awarded with the maximum points that can be acquired. Why are the suggested improvements not formulated in such a way that these are one hundred per cent SMART? This is a result of the subjective nature of the SMART assessment, e.g. someone would have examined the measures differently and would have suggested other improvements. Besides that, simply not all of the SMART conditions are applicable for every mitigation or exploitation.

In Table 7-5 the best and worst performing conditions are found for the suggested formulation of the tender documents. The lowest score in the original document is a zero score on the condition ‘attainable’ (see Table 7-2) and this lower limit has been moved up to a score of 1,33 on the condition ‘relevant’. This illustrates an improvement of the lower limit of 66,7 per cent point (see Table 7-4). Furthermore, Table 7-5 shows that the lowest scoring condition in the original formulation is turned into the highest scoring condition in the suggested formulation, i.e. measurability.

Document	Lowest scoring condition	Highest scoring condition	Overall SMART score	
			X/10	[%]
1. RA client	Time-bound	Measureable	8,78	**87,8**
2. RA vendor	Attainable	Specific, Measurable, Relevant, Time-bound	9,71	**97,1**
3. VA	Relevance	Specific, Measurable	8,67	**86,7**
Weighted Average	**Attainable, Time-bound**	**Measurable**	9,11	**91,1**

Table 7-5: interpretation of the SMART assessment of the suggested measures.

7.5.3 Wrap up

In the final step of the SMART assessment the percentage scores of the SMART conditions are compared with one other in Table 7-6. Potentially, the overall SMART score of the proposal of Royal Haskoning for the Beatrix lock project, can be improved with 42,7 percentage points. With this, it is possible to increase the average SMART score from 48,4% (insufficient – neutral) to 91,1% (good – excellent).

Weighted average	Specific	Measur-able	Attain-able	Relevant	Time-bound	Overall SMART score
Original	57,7%	20,9%	50,0%	71,1%	42,1%	48,4%
Suggested	94,8%	100%	84,1%	92,1%	84,1%	91,1%
Difference	**+37,1 p.p**	**+79,1 p.p**	**+34,1 p.p**	**+21,0 p.p**	**+42,0 p.p**	**+42,7 p.p**

Table 7-6: comparison between the original and the suggested SMART scores.

The largest improvements are found on behalf of the measurability of the measures to be defined. Largely, this is consecrated to the demonstration and underpinning of the measures with experience of the vendor in comparable projects in the past. According to this assessment, the condition that should be least worried about is the relevance of the measures. Most important aspect here is to keep in mind to mention explicitly what objectives (both direct and indirect) are affected with the defined mitigations and exploitations.

8 THE BEST VALUE ORGANISATION

8.1 Introduction

With respect to the content of the tender documents, the first steps have been made in the right direction towards a better BV tender. Substantial content improvements are necessary to improve the BV tender. These content improvements have to be realised by the BV organisation and also organisational improvements are needed to support this. In this chapter the attention does not specifically go out to Royal HaskoningDHV, addresses engineering companies in general. Therefore, first a classification of the different types of organisations is made and it is investigated what type generally fits best with engineering companies. This is done using Mintzberg's organisational structures. Based on this, the BV support team, BV tender team and the BV individual are elaborated more extensively in the subsequent paragraphs.

8.2 Classification of the organisation

Before diving into the classification of organisations, first a closer look is taken at the elements of an organisation. Mintzberg has described five elements of structure, which together form the basic parts of an organisation, i.e. the strategic apex, the supporting staff, the techno-structure, the middle line and the operating core (see Figure 8-1). The strategic apex is at the top of each organisation and consists of the general managing directors and the operating core includes all employees that produce the core products and services of the organisation. The strategic apex and the operating core are connected with each other through the middle line, which consists of managers that form a direct line of formal authority between these two. The techno-structure consists of analysts that are responsible for the adaptation of an organisation to its environment, e.g. accountants and legal councils. Finally, the support staff includes personnel that provides indirect support to the rest of the organisation, e.g. human resources, public relations and pay rolling. (Mintzberg, 1980)

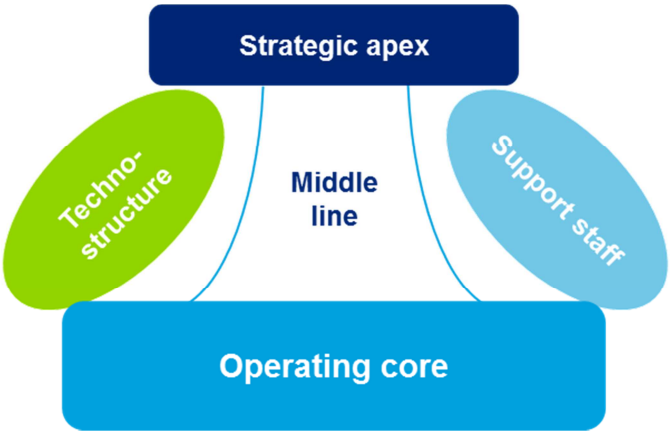

Figure 8-1: the five basic parts of the organisation (Mintzberg, 1980).

Furthermore, Mintzberg has distinguished four types of organisations, e.g. the simple structure, the machine bureaucracy, the professional bureaucracy and the adhocracy. This classification is based on two dimensions, i.e. (1) the complexity of the internal structure of the organisation and (2) the dynamics of the external environment it operates in. When plotting these variables on two axes, a plane created with four quadrants, which is visualised in figure Figure 8-2.

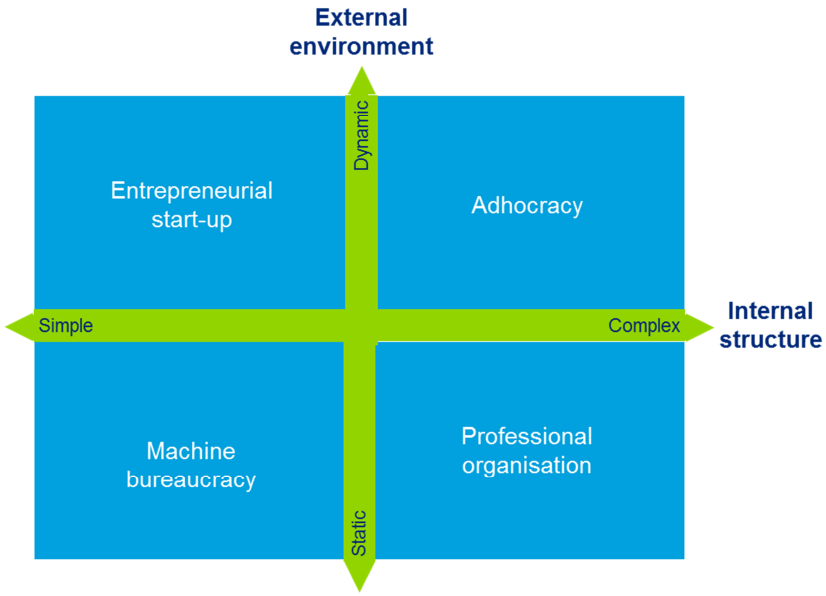

Figure 8-2: classification of organisations (Mintzberg, 2005).

Engineering companies are often complex organisations in a static environment. The organisation of engineering companies is considered to be complex, because many different types of expertise are assembled in one company. These types of expertise are organised in separate divisions and dependent on the size of the organisation these divisions can be subdivided in smaller operational groups. Although, these groups and divisions have their own customers and the project-based works are always unique, the nature of the customers and stakeholders in these projects are often identical and remain constant. Therefore, the environment is indicated as static and engineering companies classified in the lower right quadrant, i.e. the professional organisation.

Professional organisations hire highly educated specialists in its operating core and give them considerable autonomy in their work. In companies in which these specialists' tasks are subdivided in separate units have a so-called divisionalised professional structure. Because of the relatively large size of the operating core the organisation of it is decentralised both horizontally and vertically, which means much of the formal and informal power for decision making lies within the autonomous divisions of the operating core.

8.3 The BV support team

8.3.1 Composition

Figure 8-3: the BV support team.

First of all it is important to establish an official centrally led BV support team within the organisation. The BV support team consists of a group of BV Champions who together are accountable for all BV related activities the organisation. The idea is that all BV champions have acquired a BV certificate in order to makes sure all difficulties that arise during the (tender of) BV projects can be resolved within the BV support team. Within Mintzberg's five basic parts

of the organisation the BV support team is aligned in the techno-structure. In the divisionalised professional structure of engineering companies the BV support team is a coordinating body that is carpeted over the divisions of the organisation. A centralised BV support team is preferred over a decentralised one for several reasons, e.g. (1) to make information available for all employees at all times; (2) to implement important changes fast and efficient; and (3) to secure the uniformity of the company wide BV approach. (Mintzberg, 1980)

8.3.2 Tasks and responsibilities

Before the BV support team is able to start with its regular tasks and responsibilities, first there has to be developed a solid basis for the implementation of the BV philosophy in the organisation. This basis is the spinal cord of the BV support team and is vital for the success of the implementation. In Figure 8-4 a step-by-step plan for the tasks and responsibilities of the BV support team is shown in a roadmap. The road map is inspired by Kotter's eight step change model (Kotter, 1996) and Deming's fourteen point management philosophy (Deming, 1982) and is explained more extensively in the following.

Internal BVP network of Royal HaskoningDHV

In 2012 Royal HaskoningDHV has established an internal BVP network in order to create a learning environment and to offer employees the opportunity to exchange their experiences in BVP projects. The internal BVP network consists of approximately fifty employees from various departments, which come together every four months. The network is a good initiative that brings employees together and stimulates to exchange experiences with BV from practice.

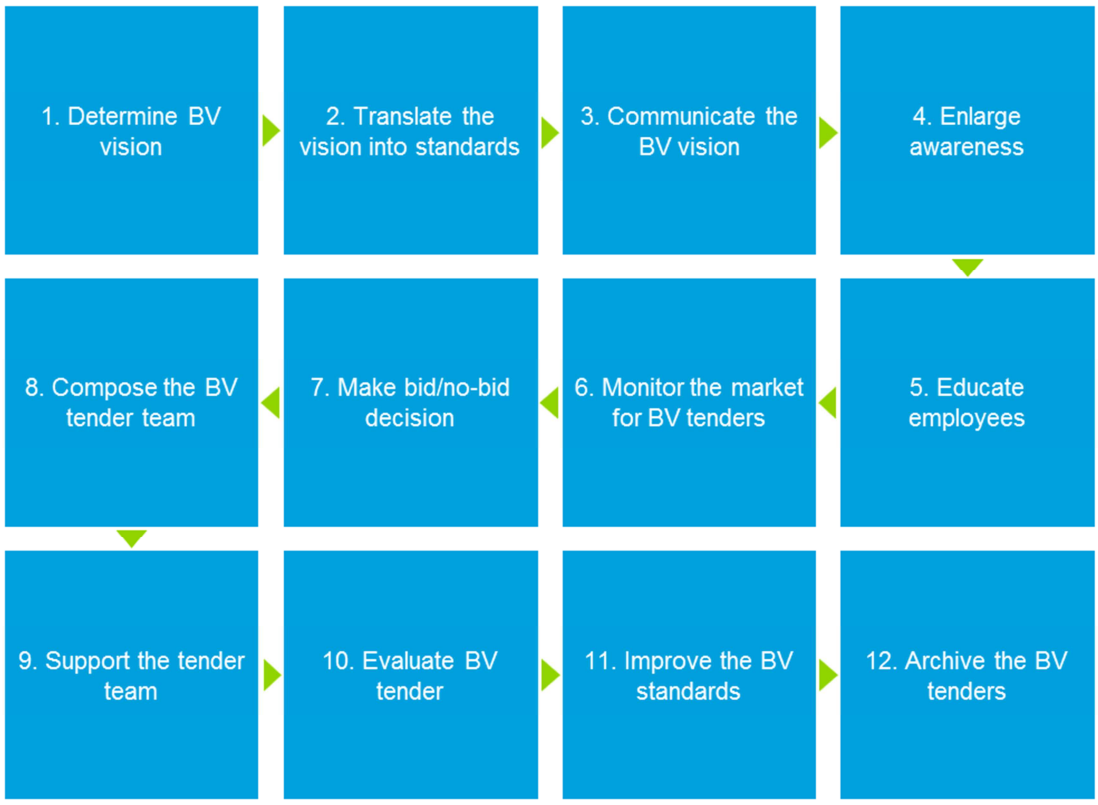

Figure 8-4: road map for the BV support team.

1. Determine a BV vision and strategy;

The very first step that has to be taken by the BV Support team is the definition of a universal BV vision, which is based on the current corporate mission. The mission explains why a company does what it is doing and the vision states what is needed to fulfil these purposes regarding BV. Hereafter, a BV strategy has to be formulated, which states how these goals are going to be achieved. In general, most employees in any company do know what they do, some employees even know how they do it, but only very few employees know why they do it. (Sinek, 2011)

However, the opposite sequence is most relevant, i.e. what and why instead of how. This was previously put forward in the composition of the tender documents. This offers direction to the employees about the internal applicable policies, the message that has to be carried out and most important why this is the way to go. The relevance of the above is illustrated with the answer of Frank de Boer (former football player, currently head coach) to the question why his team has been so successful.

"We never focus on winning the championship. This is exactly one of our strengths. The championship has to be the result of the things we think are worth striving for." – Frank de Boer

2. Translate the vision into standards;

Once it has been agreed upon what the corporate BV approach is, this approach has to be transformed into standards. The vendor can use the current experiences with BV projects to formulate the first standards. These standards provide a corporate framework for quality assurance and learning mistakes that have been made in the past. Besides that, it helps first timers to understand the corporate vision on the BV philosophy.

However, is it actually worthwhile for engineering companies to invest in developing standards? The answer is 'yes'. As seen in paragraph 8.2 engineering companies are classified as a professional organisation situated in the lower right quadrant. According to Mintzberg's classification these companies operate in a static market, which offers the opportunity for the application of standards. In a dynamic environment it is less useful to develop a lot of standards, because the demand in the market is always changing and standards are outdated rapidly.

An example for a potential standard is the SMART assessment tool developed in chapter 7. This offers insight in the conditions that contribute to the SMART formulation of the tender documents and the interviews. These standards do not only have to focus on the content of the subscription, but can also be focussed on the process or establishing new organisational bodies. For example, additional possibilities are found in points of attention put forward by the client (in the tender assessments of Rijkswaterstaat) or by the vendor's employees (in the interviews).

3. Communicate the BV vision;

In the previous two steps of the roadmap the BV support team has formulated a solid action plan to carry out BV within the organisation. Third step is to communicate the recent developments to the middle line management and the strategic apex of the organisation. These authorised bodies are accountable for strategic decisions and have to be convinced of the need and necessity of the BV philosophy for the company and the suggested associated corporate BV vision and standards. These bodies have to be

aware this decision has to be made consciously, since it is vital for the company's success with BV. Once the support has been gained the BV support team can start to enlarge the awareness among the techno-structure of the organisation.

4. Enlarge awareness;

When the middle line and the strategic apex are convinced of the usefulness of the BV philosophy it is time also to enlarge the awareness among the operating core of the organisation. As mentioned earlier the market, in which engineering companies are found, is not subject to many changes. The collaboration between client and vendor is based on methods and procedures that are familiar to both parties. Although, this environment is suitable for standardisation, the people working in the operating core of the client or the vendor are not keen on changes. In contrast with employees of a company in a dynamic environment (e.g. research and development company), these employees prefer only to apply new methods and procedures once these have been proven successful. Of course, the testing is done preferably by others (e.g. colleagues, organisations) first.

Subsequently, the BV support team has to be aware of the resistance that can be expected. Although BV has already proven itself in procurement, the sales side of BV still has to prove itself in practice. Therefore, the BV support team has to create a sense of urgency to convince the employees in the techno-structure, which can be done in two ways and is described with the following citation.

> *"No pain, no change. No gain, no change"*
> (Vandendriessche & Clement, 2006)

Here, the pain is concerned with not adopting the change and the gain is concerned with the benefits that come with adopting the change. An example of a potential pain lies in falling behind with respect to competing engineering companies. A potential gain can be found within for example projects being awarded based on expertise rather than lowest price or the reduction of time and cost for the preparation phase of a tender. Once the employees of a company in a static environment are convinced by the value of the BV philosophy it can be anchored in operating core of the organisation.

5. Educate employees;

Employees in the techno-structure that are involved in (the tender of) BV project for the first time have to be taught the principles of the BV philosophy. This can be done in several ways, e.g. through relevant literature, workshops, internal examinations or working together with a more experienced colleague. Besides that, also the knowledge of the more experienced employees has to be maintained. The BV support team has to be provided with budget to finance the declarable hours needed for education (Dutch: leergeld). This way, the BV tender team does not have to bear the costs for this and the tender costs are reduced.

6. Monitor BV tenders;

The BV Support Team has to monitor the market constantly for BV projects that are interesting for engineering companies. There are three types of projects that can be distinguished, i.e. (1) subscribe for plan study projects; (2) subscribe for realisation projects in combination with construction companies; and (3) consulting clients with the BV tender. Of course, for each of these types a different approach is needed, e.g. in the

first two the engineering company is involved as a vendor (BVS approach) and in the third it is involved on the side of the client. A lot can be learned from being involved in both sides of the BV award mechanism.

Furthermore, potential clients are found in several levels in the market. For example, in the public sector Rijkswaterstaat is not the only interesting client for engineering companies. In lower level governmental authorities projects are also tendered with the BVP award mechanism, e.g. water boards and municipalities. Also private parties start to put projects on the market with BV, e.g. contractors in search of engineering companies as a subcontractor. Although these projects are smaller in size, these offer the opportunity to gain more experience with the BV philosophy.

7. Make Bid/No-bid decision;

Besides monitoring the market for BV project, the BV support team also has to monitor the techno-structure of its own organisation to determine whether the right people for these projects are available. Based on this it is decided whether the circumstances for the procured projects are sufficient to participate in the tender anyway. It is better to be fully dedicated to a smaller number of BV projects than to participate in as much BV projects as possible. This does not only increase the success in these tenders, but it is also much more instructive for the people involved.

8. Compose the BV tender teams;

Depending on the number of key figures that are specified in the demand specification of the client, the BV tender team mostly consists of two or three members. Each of the key figures is described by the client with a task description and the BV support team has to find the best people available for matching that profile with the composition of the BV tender team. This can be done by organising internal application sessions. Aspects that can be taken into account for the selection of the BV tender team are for example (1) the candidate's expertise matches the nature of the project; (2) the candidate has sufficient experience in similar projects; (3) the candidate is willing to work according to the BV philosophy.

Furthermore, the personalities of the BV tender team members contribute to the performance of the team, but this will be elaborated more extensively in the paragraph about the BV individual.

9. Support the BV tender teams;

After the final composition of the BV tender team, one member of the BV support team is appointed to support the BV tender team during the preparation phase of the project. This so-called BV champion initiates the kick-off meeting, which is the first official meeting for the BV tender team. The BV champion is accountable for the final proposal, but is not involved in the composition of the tender documents. Among the tasks and responsibilities of the BV champion are providing the BV tender team with the corporate standards, assessing the tender documents before submission, preparation for the interviews and general support during the course of the process.

10. Evaluate BV tenders;

Once the tender documents have been submitted and the interviews have been conducted the preparation phase needs to be evaluated. It makes sense to perform an internal evaluation with the BV champion and the BV tender team first, before the results

of the tender assessment of the client are provided. This offers the opportunity to compare the strengths and weaknesses of the vendor with those of the client later on.

During the evaluation of the tender the BV tender team concentrates on the project specific points of attention. On the contrary, the attention of the BV champion is focussed more on those points of attention that contribute to the generic corporate BV strategy. Anyhow, from both perspectives it is important to take into account several aspects in the course of the tender, e.g. personal experiences, the functioning of the BV tender team and the assistance of the BV support team.

When the company has been awarded with the project, of course also the pre-award phase and the realisation phase of the project have to be evaluated.

11. Improve BV standards;
After the evaluation of the tenders the lessons learned have to be implemented in the current standards to prevent making the same mistakes again. Thus the quality of future BV tenders will increase. Therefore, the improvements have to be carried out continuously to keep the BV standards up to date at all times. If an engineering company - or any other vendor - is ahead of its competitors, then they set the standard for the entire market. This is the preferred dominant market position that is pursued by many vendors.

12. Archive BV tenders;
For practical reasons the BV support team summarises the most relevant lessons learned in an up-to-date list of best practices, which are continuously implemented in the corporate BV standards. The relevant information has to be easy accessible and ready to use for the BV tender teams. This can be realised with an open source platform on which the data can be shared by the BV support team.

8.4 The BV tender team

8.4.1 Composition

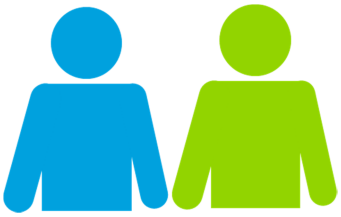

Figure 8-5: the BV tender team.

The members of the BV tender team are selected by the BV support team for each project and its composition is depended on the demand specification of the client. Most of the time the client determines how many and what type of key figures are invited for the interviews. The number of interviewees usually varies from two to three. Sometimes the client leaves it to the vendor itself to decide what key figures are most suitable for the project. However, the key figures that are questioned during the interviews automatically form the BV tender team.

In projects of Rijkswaterstaat the requested types of managers are often related to the roles in the IPM team. The role of the first key figure is always the project manager, but the role of the second key figure mostly varies, e.g. technical manager, the stakeholder manager (Dutch: omgevingsmanager) or a contract manager.

Most important is to realise that the BV tender team members are also part of the project team after the award of the project. Besides that, the terms *project manager* and *tender manager* are often used interchangeably which creates confusion, which is undesirable.

In order to provide clarity, a tender manager is any key figure that is a member of the BV tender team and the project manager is one of the possible roles for these key figures.

8.4.2 Tasks and responsibilities

In the previous paragraphs the composition of the BV tender team has been explained and in this paragraph the tasks and responsibilities of the BV tender team are clarified with a roadmap. The roadmap, visualised in Figure 8-6, shows in eight steps what important actions have to be undertaken by the BV tender team. These steps contribute the success of the proposal and are explained in more detail in the following.

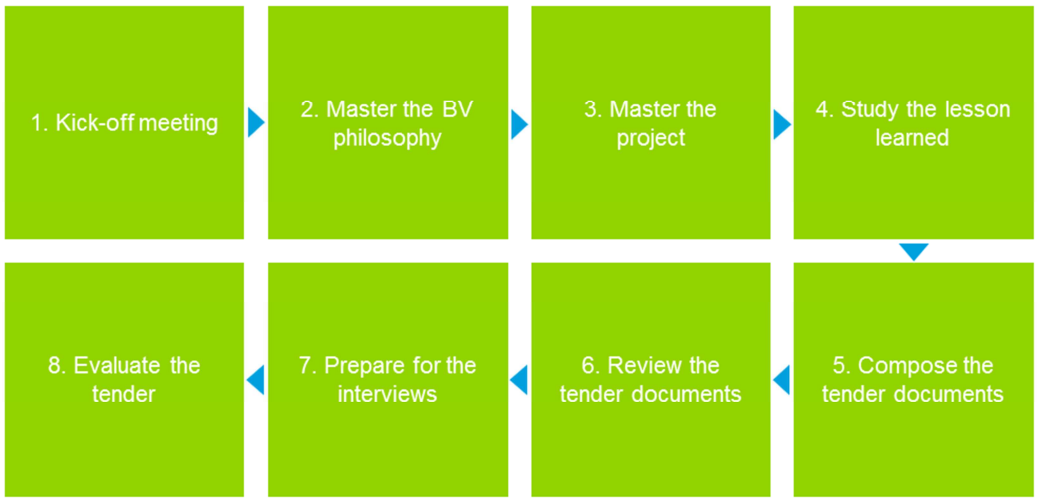

Figure 8-6: roadmap for the BV tender team.

1. Kick-off meeting;

The very first step in the tasks and responsibilities of the BV tender team is initiated by the representative of the BV support team. The kick-off meeting is the first official meeting in which both tender managers and the representative of the BV support team come together. In this meeting the deputy of the BV support team explains the corporate strategy of the engineering company that is pre-determined by the BV support team.

The members of the tender team are informed about *what* the plan of action is, *why* this is the plan of action and *how* the plan of action is being executed. Also the tasks and responsibilities of the BV support team and the allocation of the roles within the BV tender team are discussed in order to create clarity.

At all times, the tender team members are subordinate to and work in compliance with the corporate BV strategy. Because the BV support team has selected the members of the BV tender team with care, the members of the BV tender team are committed to the corporate BV strategy and do not deviate from it. After the lapse of the (tender of the) project the BV tender team members have the opportunity to express their thoughts and ideas for the optimisation of the BV strategy.

2. Master the BV philosophy;

The one BV tender team member is involved in a BV tender for the first time and the other has already participated in a BV tender before. In the beginning there will be more '*first timers'* who are selected for the BV tender team and thus these members first have to master the BV philosophy before there is moved on to the composition of the tender

documents. First and most important is to take the time needed to gain more in-depth knowledge by reading recommended relevant literature on the BV philosophy. Of course, this requires extra time during the preparation phase of the tender, but mastering the BV philosophy is necessary for the subsequent steps in the procedure.

The more a vendor participates in (the tender of) BV projects, the more employees are familiar with the BV mind-set and the less employees are involved as a first timer. As a result of the time and effort that is invested in BV, the tacit knowledge of the vendor's employees increases within the organisation and finally it will repay itself in the long run.

3. Study the lessons learned;
Besides the theoretical knowledge that is acquired from the relevant BV literature, it is also important to consult the practical lessons learned within the organisation. The BV support team evaluates all (tenders of) BV projects in which the vendor has been involved and records the information retrieved from previous BV projects in a database. Of course, the BV tender team does not have to extract the relevant lessons learned from previous projects themselves, but the BV support team provides them with an up-to-date list of best practices that is continuously improved. This way the strengths and successes of previous projects can be applied in future projects and the weaknesses and pitfalls can be prevented.

4. Master the project;
Besides the BV related aspects that are important for the preparation phase of the tender procedure, the core contents of the project of course cannot be disregarded. Similar to projects that are tendered in another way, the BV tender team members also have to master the project from the beginning to the end and backwards. Different in this approach is that the vendor does not have to write an extensive project management plan in which every single detail is written down. Instead it is sufficient to exemplify the most important risks and opportunities in the tender documents in which the focus is on the process rather than on the (technical) details.

The difference between mastering the project and going into detail lies within the relevance. A detail that does not affect the project in one or another way (i.e. if it does not influence one of the project objectives) it is not relevant for the project and can be omitted for the tender documents and the interview.

5. Compose the tender documents;
When the necessary relevant information of the BV philosophy and the project have been acquired, it is time to start with the composition of the tender documents. Currently, the risk assessment client, risk assessment vendor and the value added are the fundamental aspects that are represented in the majority of the tender documents. The configuration of the quality criteria may vary from one BV tender to another, e.g. additional quality criteria could be a scope definition or a planning.

In the composition of the tender documents it is of importance to take into account the lessons learned from previous projects, e.g. as have been put forward in the tender assessment of Rijkswaterstaat in chapter 5 and in the interviews in chapter 6.

6. Review the tender documents;

After the draft version of the tender documents is ready, it is time to critically review the tender documents. Firstly, the tender is compared with a standard checklist by a representative of the BV support team. Secondly, the observations and remarks are discussed with the BV tender team. Hereafter, the necessary modifications are carried out and the last adjustments are made. The final version of the tender documents is reviewed one last time by the BV champion and after this it is ready for submission.

7. Prepare for the interviews;

The preparation for the interviews actually already started with the kick-off meeting and in the subsequent steps the BV tender team members gradually are prepared for the interviews. After the final version of the tender documents has been completed, the members of the BV tender team are entirely acquainted with the BV philosophy and the content of the project and are ready for the interview training.

The BV support team prepares a rehearsal interview well in advance, i.e. at least a week in advance and certainly not the day before the official interview. In the rehearsal the BV support team simulates the setting of the official interview and the key figures are prepared for the interview that lies ahead with the questionnaires of former interviews. This way the key figures have the opportunity to refine their answers and perhaps even practice it once more. Consequently, they are not confronted with unexpected situations and are more confident to conclude the interview in a successful way.

8. **Evaluate the tender;**

The final step of the roadmap of the BV tender team corresponds with the evaluation step in the roadmap of the BV support team. Additional information about the content of this step is provided in the tenth step of the roadmap of the BV support team.

8.5 The BV individual

Figure 8-7: the BV individual.

The final BV part of the organisation is the BV individual. In the theoretical framework the classification of individuals is already discussed in the KSM and in the interviews the best man in the right place at the right time has been put forward. Now, the question arises who these BV individuals are? To start with, the BV individual has to have (1) experience (Dutch: ervaring) with similar projects in the past; (2) the right expertise (Dutch: kennis) for the project; and the skills (Dutch: kunde) or character to act to his or her best abilities. In most professional organisations, such as engineering companies, the right expertise and experience are always present within the organisation. The right skills are also present in the organisation, but are not so easy to identify as expertise and experience.

Therefore, this third aspect is put under the microscope to gain insight in what skills are important for the BV individual. This is done by comparing the characteristics of the Myers-Briggs Type Indicator (MBTI) and the principles of the BV philosophy. On beforehand, it is mentioned that the classification of the MBTI is defined in extremes (e.g. black or white) and that people are not just the one or the other, but often possess characteristics of both personality types. Besides that, let it be clear that not one person is more important or better than another person and that everybody is necessary to achieve the mutual goals.

8.5.1 Myers-Briggs type indicator

In 1921 Carl Jung published his book *"Psychologische typen"* in which he described three basic types of human personality. Katherine Cook Briggs and Isabel Briggs Myers used Jung's psychological types as a starting point for their MBTI personality test. Here, they have described psychological *general* attitude types (i.e. extrovert versus introvert) and two psychological *functional* types (i.e. sense versus intuition and thinking versus feeling). In later studies Myers and Myers-Briggs added a fourth dimension, i.e. judging versus perceiving. In the MBTI approach individuals are classified by means of these four dimensions and when combining the two extremes of each dimension, there are distinguished sixteen different psychological types. These types are expressed with a four letter code, each representing one of the extremes of the four dimensions. (Quenk, 2009)

In the following the characteristics of each of the extremes of the four psychological types of the MBTI are elaborated further. A closer look is taken at the characteristics that are useful and those who are not from the perspective of the BV philosophy. The considerations that are put forward can be taken into account for the composition of the BV tender teams.

1. Extrovert or introvert (E/I)

The first category of character properties describes the direction in which people focus their attention and energy. Extrovert people concentrate their attention and energy outward and seem very energetic. On the contrary, introverts concentrate their attention and energy inward and come across shy like. In Figure 8-8 some characteristics of the extrovert and introvert people are shown.

With respect to the properties that are helpful in the BV tender team, some aspects are highlighted here. First of all, the composition of the tender documents is done by the BV tender team. Working in teams requires collaboration between the team members, but the introvert prefers to work alone. On the contrary, extroverts are more likely to draw their own plan and not abide by the BV philosophy. So which one is the most important?

Another aspect that is quite relevant for this category has to do with the interviews. It is obvious introvert people could experience difficulties with being questioned individually. This could be considered as being put on the spot, which is often an uncomfortable situation for introvert people.

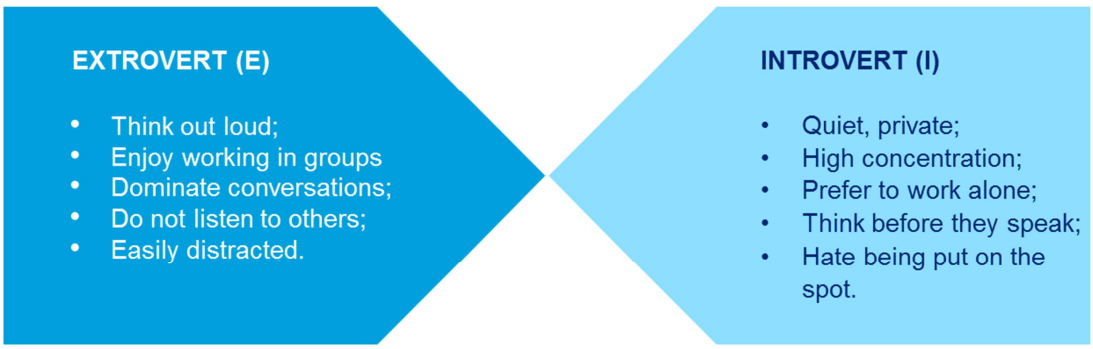

Figure 8-8: characteristics of extrovert versus introvert people (Tieger, 2011).

Finally, there are some problems that might arise in the collaboration between the extrovert and the introvert. These have to do with the communication between these two. The extrovert prefers to interact with people and *asks* the introvert to speak up his mind. On his turn, the introvert *thinks* why don't you shut up and listen, extrovert?

2. Sense or intuition (S/N)

The second psychological type is one of the two functional types and concerns the perception of information. Figure 8-9 shows the characteristics traits sense and intuition. Sensing people are most comfortable with details and facts and are mostly oriented at the past and the present. Intuitivists are more interested in the relations between the facts and the possibilities of the available information and therefore are more focussed on the future.

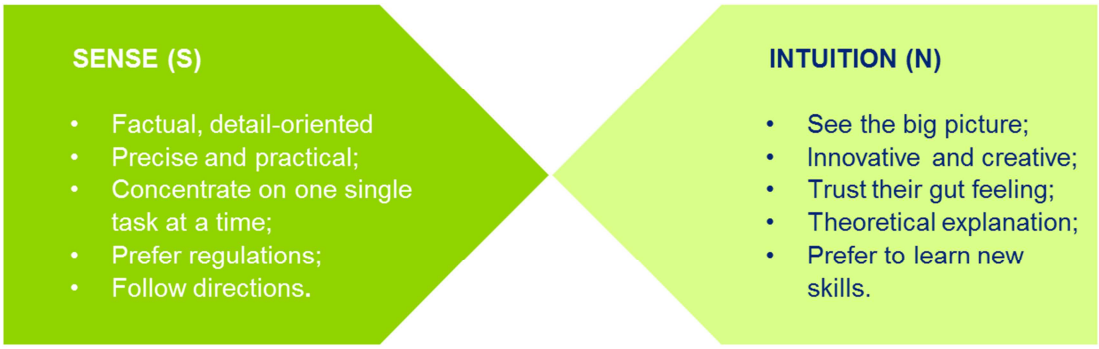

Figure 8-9: characteristics of sensing versus introvert people (Tieger, 2011).

In the KSM it is stated the 'type A' vendor has to think in the best interest of the client or in other words keeping in mind the bigger picture. This perfectly matches the intuitive person, but also an example of a match of the sensing person with the BV philosophy can be shown. Sensing people prefer regulations and follow directions and thus are more likely to comply with the standards defined by the BV support team.

Two additional examples illustrate characteristics from both extremes that are both applicable in the BV philosophy. Factual information of the past is needed to demonstrate the vendor's performances. These are features that are found with sensing people. However, this information is needed to look into the future and predict the final outcome of the event, as one of the principles of the IMT. On its turn this features is seen with the intuitive people. So which one is the most important?

3. Thinking or feeling (T/F)

The extremes thinking and feeling are also concerned with one of the two functional types. Instead of the way information is perceived, this psychological type has to do with the way people make decisions. Where thinkers tend to make decisions based on objective and logical criteria, feelers tend to make subjective decisions based on how they personally feel about certain choices. In combination with the above thinkers prefer to look at problems from a distance and observe it from a helicopter view. On the opposite feelers prefer to dive into a problem to experience it themselves. Figure 8-10 show the properties that are part of the character traits thinking and feeling.

An example retrieved from the KSM has to do with relations between the client and the vendor. Or to be exact the lack of relations that is encouraged in the KSM. The relation between client and vendor has to be strictly professional and based on facts and

achievement. People that prefer feeling over thinking tend to be people oriented and value a good relation, but these are features that do not belong to the BV philosophy.

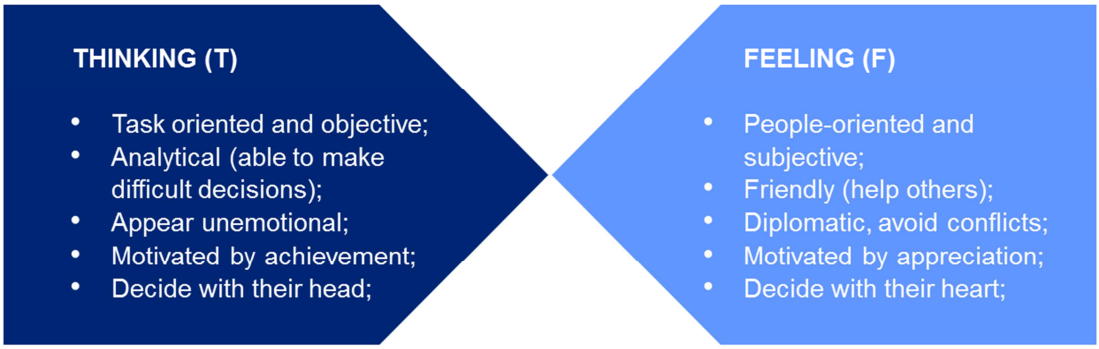

Figure 8-10: characteristics of thinking versus feeling people (Tieger, 2011).

As also quoted in the previous psychological type, it is stated in the IMT that decision making belongs to the non-visionary or the blind people. Visionaries can look into the future, already know the final outcome of the event and thus do not have to make any decisions. However, this is exactly an aspect that is part of the characteristics of the thinking person. So which one is the most important?

4. Judging/perceiving (J/P)

The last dimension of the MBTI is typified as a person's attitude towards the external world and the way in which one orientates himself to it. The extremes in this dimension are judging and perceiving and their properties are shown in Figure 8-11. People indicated as judgers prefer a structured and predictable environment and like to arrange things in advance. People that are indicated as perceivers prefer to experience the world as it comes and keep their options open and do not mind to adapt.

People who are structured and organised and have an action plan for the project seem to be ideal for every project. Risks are identified, mitigations have been formulated and even residual risks are defined. However, when something unexpected happens that has not been taken into account on beforehand, judging people do not know have to cope with the situation. Perceiving people are more desirable in situations like this.
So which of one is the most important?

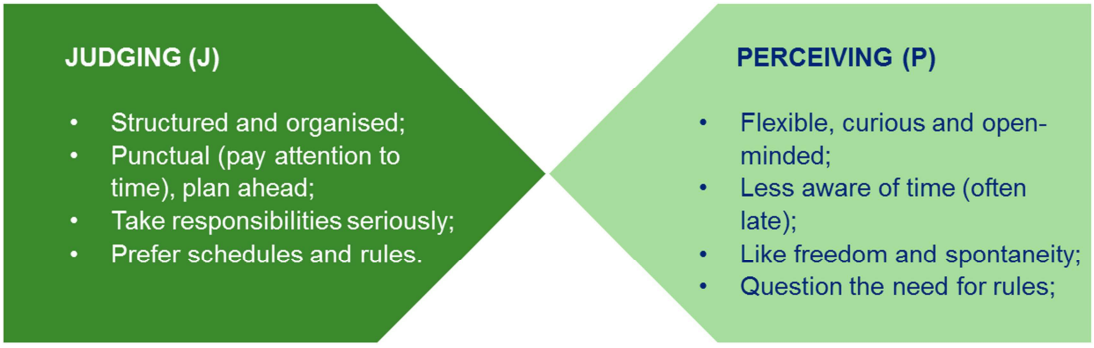

Figure 8-11: characteristics of judging versus perceiving people (Tieger, 2011).

Furthermore, possible conflicts between judgers and perceivers lie within the way people approach their work. Judgers look at perceivers as unproductive people who are not taking their work seriously, whereas perceivers look at judgers as rigid people who only see things in black and white. It is important to be aware of this as a team.

8.6 Reflection

Starting with the BV organisation, in Mintzberg's classification the engineering company has been identified as a professional organisation and it is surprising to see the similarities between Mintzberg's theoretical description of this type of organisation and reality. For example the height of the knowledge level in and the large size of the operating core of the professional organisation are also recognised in engineering companies. Besides that, the typification is also used as underpinning for the motivation of the tasks and responsibilities of the BV support team and the BV tender team. For example it explains why standards do not work in every type of organisation.

In the search for the BV individual there is elaborated on the type indicator developed by Myers-Briggs and the characteristics of their personality classifications is confronted with the principles of the BV philosophy. In this analysis it is seen that the two extremes in all four aspects of the MBTI both contain properties that are helpful and properties that are hindering for the preparatory works for BV projects.

Therefore, ideally the BV individual should have the relevant characteristics of both the extreme types indicated by Myers-Briggs. It is clear that this perfect person does not exist, but these bests of both characteristics do not have to be found within one person. Consequently, this implies that the two members of the BV tender team should be complementary to one other. For example, when the first key figure is identified as an INTJ person then it is best to select a second key figure that is identified as an ESFP person. In practice it is almost impossible to find two BV tender team members for a project with two complete opposite MBTI scores and thus mostly one or more characteristics of the MBTI are represented more and others are represented less frequently. This does not have to be problematic for the tender of a project, but the BV support team has to be aware of the imbalance in the BV tender team and pay extra attention to the associated deficiencies.

For example, when both key figures are indicated as sensing instead of intuitive people, then at least it is assumed the measurability (from the SMART assessment) of the tender documents is done properly. This, because both key figures are factual and are mostly oriented on the past and the present. Subsequently, it is likely more attention is paid to the underpinning of the mitigations and exploitations. However, this team is also likely to experience difficulties in defining risks and opportunities during the composition of the tender documents, since both key figures lack innovation and creativity, Therefore the BV support team has to monitor the MBTI scores in composing the BV tender teams and offer support in the shortcomings of the BV tender teams.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

In this master thesis opportunities have been investigated to increase the scores on the award criteria in BVP tender procedures (see paragraph 1.2). This final chapter answers the research questions that have been investigated throughout the report. Line by line first the sub questions are answered, which results in the answer to the main research question. Furthermore recommendations are put forward that induce towards the BV vendor. Finally, the end of the thesis report is concluded with suggestions for additional research.

It has to be mentioned that the general applicability of this research has its limitations, since the results have been obtained from a limited number of projects. The analysis of the points of attention in the tender assessment of Rijkswaterstaat (chapter 5) is only based on two subscriptions for one project. The points of attention retrieved from the interviews (chapter 6) are based on all three projects of the case study, but not all involved key figures have been interviewed. Therefore, the results of this research are not generally applicable for other BV projects (yet).

9.2 Answers to the research question

1. *What exactly is the BVP award mechanism?*

The BVP award mechanism is the implementation of the BV philosophy into an award mechanism, which aims to select the best vendor available for a project. The BV philosophy is a mind-set that aims to stimulate people to think and act in the best interest of the client. Eventually, this will be beneficial for both the client and the vendor. (See chapter 3)

   a. *How do the Information Measurement Theory (IMT) and the Kashiwagi Solution Model (KSM) contribute to the BV philosophy?*

The IMT and the KSM are the cornerstones of the BV philosophy. In the IMT it is stated that every event (or project) can only happen in one way. Visionaries (or experts) look into the future and predict the final outcome of a project in advance and the non-visionaries (or blind people) cannot. In the KSM a classification is presented that distinguishes two types of people of whom the properties are described. Two extremes are defined as the ‘type A’ and the ‘type C’ people, which correspond respectively with the visionary and the blind people. (See appendix A)

   b. *What are the targets of the BVP award mechanism?*

The BVP award mechanism aims to realise a paradigm shift from price-based competition towards value-based competition. Here, the focus is on delivering projects with the highest value for the lowest costs. Most importantly, BV aims to stimulate every company in the supply chain to transcend the walls of their silos; contribute to the final output of the supply chain; and think and act in the best interest of the end user. (See chapter 3)

2. *Why should the BV philosophy be adopted by engineering companies?*

Besides more value for money for the client, the BV philosophy also aims at more profit for the vendor in order to be beneficial for both parties. Although the benefits for the vendor are not always visible in practice, the results will increase with the experience. Above all, the BV philosophy reverts to an engineering company's reason of existence, i.e. consulting clients by showing expertise.

a. *What can be expected of the future plans from potential clients in the construction industry with respect to the BVP award mechanism?*

From 2009 on, the number of projects tendered with BVP in the Netherlands has increased every year. When this trend is continued the coming years, this is a promising prospect for the future with even more BVP tendered projects.

This applies to (1) both public and private clients; (2) in the construction industry and other industries; and (3) for plan studies and realisation projects. Also Rijkswaterstaat, as the most important client in the Dutch construction industry, increases the number of BV projects in the short term. After drawing up the balance sheet in 2015, Rijkswaterstaat determines their BV strategy for the next decade. (See paragraph 3.5)

b. *What are the experiences of engineering company's employees with the BVP award mechanism in practice?*

The first impression of most vendors sure is positive. In particular, vendors appreciate the project being awarded to the best performing vendor, which offers vendors the possibility to show their expertise. The theoretical benefits for the vendor do not come about in all projects in practice yet. However, the majority of the vendors attribute the absence of these benefits to the lack of experience in working with the BV philosophy. (See paragraph 6.3)

3. *What points of attention have to be taken into account to increase the scores on the award criteria in BVP tender procedures from a private party's perspective?*

Throughout the master thesis many suggestions have passed that have the potential to increase the scores on the award criteria in BV tenders. However, first steps can be taken applying the SMART assessment tool, since this point of attentions is indicated as the most important by client and vendor. (See chapter 5 and 6) Above all, this tool contributes to the improvement of every quality criteria in the BVP award mechanism.

d. *Where are the points of attention to be found, that have the potential to increase the scores on the quality criteria in BVP tender procedures?*

With the *wAIE* introduced in chapter 4 the potential areas for improvement are indicated. In the projects of the case study there is approximately 25% unexploited potential randomly divided over the award criteria. In chapter 5 and 6 both client and vendor have put forward several points of attention, varying from coupling risks and opportunities to the project objectives to developing internal BV standards.

e. What steps have to be taken in order to implement these improvements?

For the implementation of the identified improvements, the points of attention have to be made measurable. This way insight is gained in the vendor's performance, which can be used in the demonstration of the vendor's expertise. With the SMART assessment tool SMART formulation has been made measurable, which can be applied for both the tender documents and the interviews. (See chapter 7)

f. What are the thoughts of the employees of private parties on the applicability of the developed tool in practice?

In order to validate the SMART assessment tool the idea was to test the applicability of the tool with vendor's employees in a workshop or to apply it in a real life tender. Unfortunately, this final validation step has not been implemented in this research, because there is insufficient time to take the results of the validation step into account.

What are the opportunities for vendors to increase the scores on the award criteria in BVP tender procedures in order to structurally improve the success rate in tender procedures procured with the BVP award mechanism?

Throughout the master thesis many suggestions for improvement have been put forward to increase the scores on the award criteria of the BVP award mechanism. The nature of these suggestions is related to both content improvements (See paragraph 5.3.1 and 6.3) and organisational improvements (see chapter 8). Towards the BV vendor, the main research question is answer based on the following recommendations to increase the scores on the award criteria in BV tender procedures.

1. Apply the SMART formulation in the tender documents and the interviews;
2. Set up a corporate database in which measurable performance indicators are recorded;
3. Formalise the separate BV initiatives in an official BV support team;
4. Implement the BV philosophy throughout the entire organisation.

9.3 Suggestions for further research

Furthermore, this research has thrown up many questions in need of further investigation. Besides the opportunities mentioned above, there are also unexplored opportunities that could contribute to the improvement of the success rate in BV tenders, but for which additional research is needed. In the following four possible directions for further research have been proposed.

The first suggestion for further research is about validation of the research and conducting this research for a larger number of tenders. Although the results have been obtained from a limited number of projects, the research describes a systematic approach to investigate BV tenders and therefore approach applied in this report is a legitimate way to collect the required data. The more data is collected, the more generally applicable the results and recommendations will be. It is expected that when this research approach is applied on a larger number of projects similar results will be obtained. Of course this can only be confirmed by investigating more projects.

Secondly, in this research only one points of attention has been worked out in more detail, i.e. making the SMART formulation measurable with the SMART assessment tool. However, in chapter 5 and 6 also other points of attention have been put forward that can be made measurable. This makes it possible to assess the tender documents before submission by which the average quality of the subscriptions will increase.

Thirdly, in relation with this, measurable performance indicators have to be developed which can be used to demonstrate the vendor's experience with the mitigations and exploitations. The performances of the applied measures can be underpinned with the metrics measured for every project. This has to be done with a number and a unit, e.g. the effectiveness expressed as a percentage or the client satisfaction expressed with grades from one to ten. Consequently, a database needs to be built up with measurable performance indicators of which the reliability increases with the number of projects that will be executed. The points of attention of this research offer possible directions for the development of measurable performance indicators.

The fourth suggestion for further research concerns the interviews. This quality criterion is often indicated as the most important aspect of the BVP award mechanism, but has not been elaborated in this research. However, the interviews still have a large undiscovered potential for improvement, but perhaps these opportunities have to be found in another discipline, e.g. in the field of communication and/or psychological sciences.

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APPENDICES

APPENDIX A: UNDERPINNING OF THE BEST VALUE PHILOSOPHY

1 INFORMATION MEASUREMENT THEORY

The first of the two theories that underpin the BVP theory is the *Information Measurement Theory* (IMT). This theory is developed by Dean Kashiwagi and was first published at the Arizona State University in 1991. As the BVP theory is based on the IMT and the KSM, the IMT is based on a preceding theory itself, i.e. the Information Theory published by Claude Shannon in 1948. In the Information Theory it is stated that all communication systems are fundamentally the same and all have a constrained delivery speed. Shannon was the first to state that the constraint in communication is the transmission speed of the medium and not the noise of the environment. Information transmitted below the constrained delivery speed can be processed perfectly, but above the speed it is not possible to transmit information in an optimal way. (Waldorp, 2001)

The fundamental idea of the IMT is that natural laws and initial conditions define all events, and all event outcomes are predictable with all information. With this in mind, the IMT aims to accomplish the following five goals:

1. Minimise subjective decision-making through the use of dominant information;
2. Minimise the amount of data required to accurately transfer information;
3. Identify the relationship between information usage, processing speed, and performance;
4. Identify a structure that minimizes the requirements for decision making, direction, and control of another entity;
5. Optimise processes by identifying and removing entities which increase risk and add no value (i.e. any party making decisions, directing, and controlling another party, with no accountability or risk).

These goals originate from the definition of the IMT formulated by Kashiwagi. This definition is also used as the general applicable definition in this thesis and is formulated below.

> *"A deductive, logical explanation of an event. It includes the use of relative and related data to create information that predicts the future outcome of the event."* (Kashiwagi, 2004)

The above definition of IMT is not immediately clear to everyone, because not all terms are unambiguously understood. Now, let's have a closer look at these terms in order to make sure everyone is facing in the same direction concerning the IMT. The following terms are further explored *deduction* (versus induction), *logical* (versus illogical), *relative* (versus irrelative) and *related* (versus unrelated). Later on, there is also elaborated more extensively on the term *'event'*.

1.1 Laws of physics

The first concept of the IMT involves the laws of physics, e.g. the universal law of gravity or the Archimedes' principle. These laws determine the physical environment and predict the future outcome of an event, in any state and at any time. The number of laws of physics is constant and does not change over time. This is in accordance with the *No Boundary Theory* of Stephen Hawking, which is demonstrated in Figure 1-1.

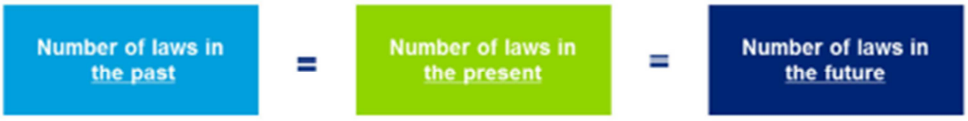

Figure 1-1: laws of physics (Kashiwagi, 2004).

Although the laws of physics are and always have been present, they simply might not have been discovered at any given moment in time. This is an important observation; laws are not created, but are discovered over time.

1.2 Description of an event

The second concept of the IMT defines the term 'event'. Here, an event is defined as *"anything that happens that takes time"*. Figure 1-2 illustrates the characteristics of an event. First of all each event has its unique set of initial conditions and its unique set of final conditions. However, the second aspect of an event remains constant throughout the event, i.e. number of laws of physics. All (segments of) events are related by cause and effect, only happen in one way and only have one final outcome. In case the final outcome of an event cannot be predicted because not all information can be acquired, this does not suddenly increase the number of final outcomes of an event. For example it is impossible for a person to step in an airplane and arrive in London and Berlin at the same time.

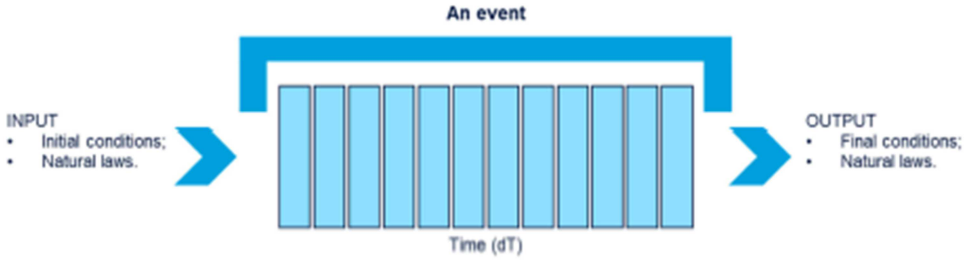

Figure 1-2: an event (Kashiwagi, 2004)

Besides that, every event takes time and the shorter the event the less information is needed to predict the final outcome. The more information one perceives of the initial conditions and laws, the more precise one can predict the final outcome of the event. However, it is not possible to perceive 'all' information for an event and not all people have the same level of perception. Subsequently there arise differences between people in predicting the final outcome of an event. This is further elaborated in the following paragraph.

"Everything is at equilibrium. Nothing happens by chance. All information is always there. Those who can 'see' can predict the future. Everything happens only one way. Those who cannot see are 'blind'. Probability exists only in the minds of the 'blind'. Those who are blind, do not change, cannot apply concepts of logic, and hide in complexity and technical jargon."

1.2.1 Perception of information

Figure 1-3: the cycle of learning (Kashiwagi, 2004).

Every individual is different and all people are in an environment that contains 'all' information. However not every person is able to perceive all of the information that is available. People are able to increase their amount of information by (1) perceiving information that was not perceived before; (2) process the information; and if they understand it, (3) apply the information. The application of the new perceived information causes change and change, on its turn, again increases the perception of information. This process is called the cycle of learning and is shown in Figure 1-3.

The processing speed of people determines the ability to perceive information. The faster one is able to process new information, the higher the change rates and the more skills one can acquire. When the cycle of learning is gone through numerous times, also the cycle's speed increases. Figure 1-4 illustrates the rates of change of three different types of people (type A, B and C). The 'type A' people use a high level of information; the 'type B' people use an average level of information; and the 'type C' people use a small amount of information.

'Type A' people have a high level of perception and a high processing speed. According to the cycle of learning these people perceive more information, process it faster, apply it a greater number of times and thus change faster than the 'Type C' people.

Two individuals B1 and B2 possess almost the same amount of processing speed, amount of information perceived and rate of change. These two types of people are hard two differentiate and so are the future outcomes they predict. This will require a lot more information than comparing type A and type C individuals. For this reason the IMT focuses on these two extremes and deductive logic can be applied instead of the more costly inductive logic.

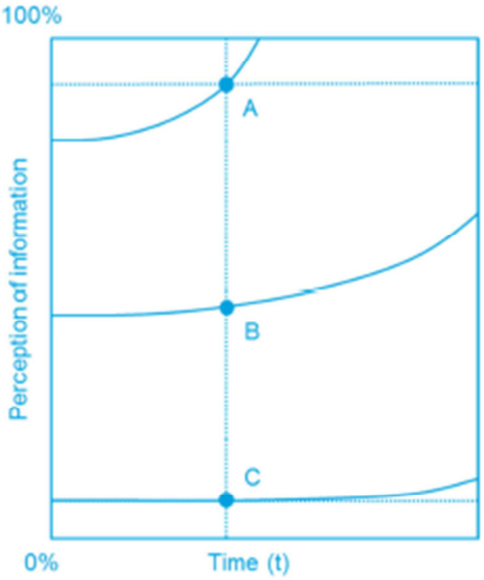

Figure 1-4: rate of change of similar individuals

Last but not least, let there be no misunderstanding about the following. Within an environment, there are individuals at different relative levels. No person is more important, or better, than any other person. Every person is a part of the event and the event cannot happen without any of its parts.

2 KASHIWAGI SOLUTION MODEL

The IMT serves as the starting point for the second theory that underpins the BV philosophy, i.e. the Kashiwagi Solution Model (KSM). The principle of the KSM is illustrated in Figure 2-1. The model consists of two rectangular triangles, i.e. a left side (LS) and a right side (RS), which together form a rectangle. Both triangles always correspond with opposite characteristics, e.g. experience (LS) and no experience (RS), and together these add up to the two-way Kashiwagi Solution Model.

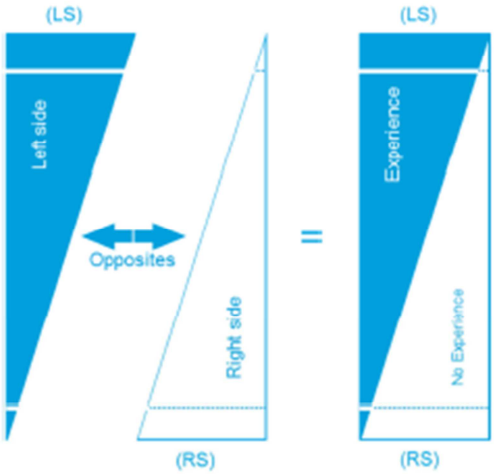

Figure 2-1: the two-way Kashiwagi Solution Model (KSM) (Kashiwagi, 2004)

The objective of the KSM is (1) to determine if a characteristic belongs to the left side or right side, (2) to evaluate whether one entity has more information than another entity and (3) to identify the relationship between different factors and the level of information.

2.1 IMT and KSM

The principles from the IMT are used to indicate everything is relative and related. The coupling between the rate of change model and the KSM is illustrated in Figure 2-2. Here, the information to predict the final outcome of the event (as explained in the IMT) is taken as an example. The 'type A' person is the one who gathers sufficient information to predict the outcome of an event in contrast with the 'type C' person who gathers insufficient information and thus cannot predict the final outcome of an event. Besides that, it is not only about the quantity of information perceived, but also about the quality of the information, i.e. did the person acquire the right (or relevant) information.

Generally, this classification refers to the type 'A person' as the person who acts in line with the BV philosophy. Furthermore, it should be noticed a simplification of the rate of change model is applied in the KSM, i.e. only the type A and type C person are being used and the 'type B' person is disregarded. Underlying reason is to distinguish the differences between the types of people more clearly.

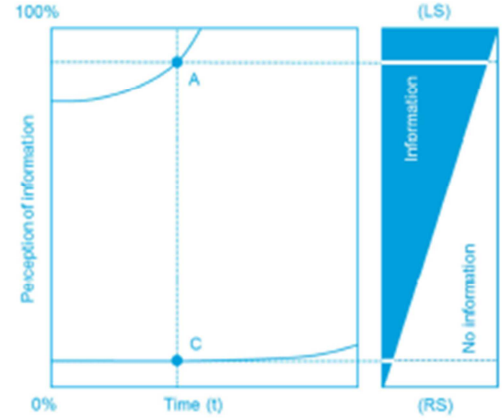

Figure 2-2: Rate of Change model and the KSM model

In his book, "Best Value Procurement: how to use information systems to minimise risks, increase performance and increase efficiency" (Kashiwagi, 2004), Kashiwagi elaborates on numerous characteristics for different situations in which the difference in the course of action of the 'type A' and 'type C' persons explained. Here, a few of these characteristics are worked in more detail to indicate what features are in line with the BV philosophy and which are not.

The starting point of the KSM is to apply the BV philosophy as an award mechanism and award on quality rather than on lowest price. Next, clients have to stop formulating endless lists with requirements or demand specifications and instead offer the market parties (vendors) the room to show their expertise. The vendor is precisely the one who is the expert and thus knows best how to achieve the objectives of the client. Coherently, the ´type A´ vendor (i.e. the expert) thinks in the best interest of the client, while the ´type C´ vendor only focusses on increasing his own benefits.

In order to think in the best interest of the client it is crucial to transcend the singular contribution of a company and for contribute to the higher purpose, i.e. the supply chain as a whole. With this the delivered performance increases together with the client satisfaction. There is no need for the client to monitor the works of the 'type A' vendor, because (1) the client has not specified any requirements and (2) the vendor already monitors his own works in order to safeguard his own performances.

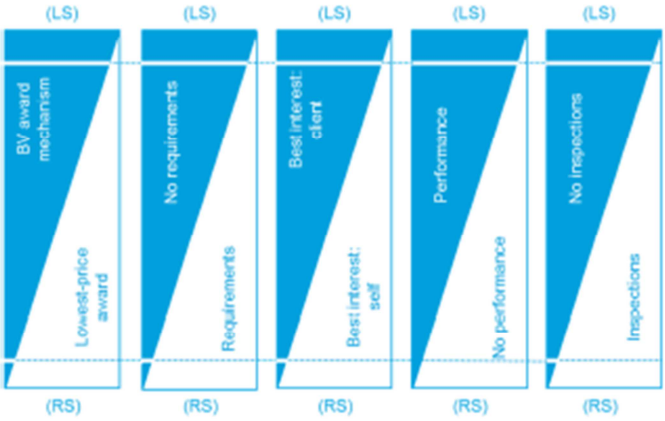

Figure 2-3: the KSM model extended (1).

In Figure 2-4 there is continued with the information aspect, which is already explained in the beginning of this paragraph. The more relevant information a person has acquired the less decision have to be made. After all, a person who can predict the final outcome of an event does not have make decisions, because one knows what is about to happen. The reduction of the decision making of a 'type A' vendor is the result of experience gained in previous projects. Subsequently, the expert vendor can be more transparent to the client by demonstrating these previous results on beforehand. The 'type C' vendor, on the contrary, lacks experience and is

forced to make decisions. This way this vendor is not capable to fathom the project from the beginning, the complexity of the project increases and becomes less transparent.

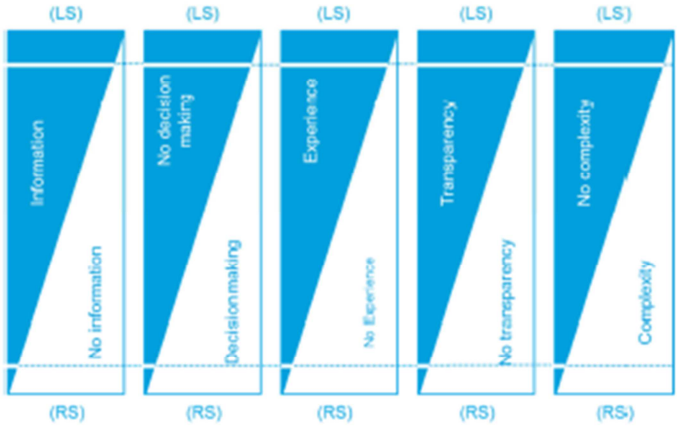

Figure 2-4: the KSM model extended (2).

In the previous chapter an introduction is presented regarding the IMT and in the latter chapter the KSM is illustrated on the basis of a selection of aspects that are attributed to the 'type A' or the 'type C'. For more information about the IMT or the KSM it is recommended to consult the book "Best Value Procurement: how to use information systems to minimise risks, increase performance and increase efficiency" (Kashiwagi, 2004)