

# RESULTS OF AN EXPLORATIVE RESEARCH INTO VALUE QUANTIFICATION METHODS

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**ABSTRACT:** This paper presents the results of an explorative research into value quantification methods called the Quick Scan. An overview of value quantification methods was needed in order to be able to establish the economically most advantageous tender, which in turn is needed for improvements in the Dutch construction sector. The Quick Scan project researched the literature, consulted experts and interviewed those involved in construction projects. Several value concepts and accompanying quantification methods have been found.

**Keywords** – Differentiation strategy, economically most advantageous tender, public value, quantification methods, value.

## 1. INTRODUCTION

This paper presents the results of an explorative research into value quantification methods entitled the Quick Scan. Context of this research is the ongoing effort to realize better ways of procurement and co-operation in the Dutch construction industry by enabling selection based on “economically most advantageous tender” instead of “selection based on the lowest price for a fixed and very detailed specification”.

Section Two describes the theoretical background of value/price based selection is described in section two.

Section Three describes the approach of the Quick Scan approach. The results of this project are represented in section Four. Conclusions and recommendations are respectively discussed in section Five and Six.

## 2. BACKGROUND OF THE RESEARCH

### 2.1 Background

In the year 2002 evidence of collusion in the Dutch construction industry, especially in the sector of public works, caused great public outrage. A parliamentary enquiry committee concluded that radical measures were needed to overcome similar cases. Transformation institutes were installed and contractors that had made illegal price agreements were persecuted.

In the mean time one of the largest principals in the Dutch industry for public works, the Directorate-General for Public Works and Water Management, was already reorganizing and trying out new ways for procurement. Already, much earlier than the public outrage, it had concluded that the “selection based on lowest price in combination with a very detailed design brief” was contributing to unhealthy market dynamics.

Because of the tender regulations and moreover the way they are implemented, contractors were not able to distinguish themselves on anything but the lowest price. The

motivation for creative and smart solutions was taken away and the already thin profits were becoming negative. Instead of fighting each other, the contractors decided to fight their main client by resorting to making price agreements, blocking competitors and dividing the market. This behaviour is in no way justifiable, but it is nevertheless understandable in the context of the vicious circle of price competition and with the absence of any possibility for other ways of competition.

## 2.2 Competitive strategies

Porter (1980) distinguishes between three generic strategies commonly used by business enterprises namely the Cost Leadership Strategy, the Differentiation Strategy and the Focused Strategy [URL 1]:

1. The Cost Leadership Strategy emphasizes efficiency. By producing high volumes of standardized products, the firm hopes to take advantage of economies of scale.
2. The Differentiation Strategy involves creating a product that is perceived as unique. The unique features or benefits should provide superior value for the customer if this strategy is to be successful.
3. In the Focused Strategy the firm concentrates on a selected few target markets. It is hoped that the needs of that target market can be met better by this specialisation.

Treacy and Wiersema (1993) have modified Porter's three strategies to describe three basic "value disciplines" that can create customer value and provide a competitive advantage. These are operational excellence, product leadership, and customer intimacy:

1. Operational Excellence provide reliable products for very competitive prices on a user friendly way.
2. Product Leadership is a strategy about technologically advanced products, quick commercialisation and constant improvement
3. Customer Intimacy is a very precise tailoring of the supply to a specific niche market. Thorough knowledge of the client and quick adaptation to the needs of the clients is needed. The focus is on customer's lifetime value, that can imply that initially, services are provided below production costs, because these costs will be compensated in later stages due to customer loyalty.

The tender regulations of public works prescribe two ways of selection: lowest price or "economically most advantageous tender". Because the second way involves more than one selection criterion, it is often perceived as more difficult, or more difficult to account for. For this reason principals often fall back to selection based on lowest price and in doing so they blocking the differentiation strategy in doing so.

The customer intimacy strategy is also blocked. Because of tender regulation and the policy to stimulate market dynamics, public clients cannot afford to establish a long-term relationship with one supplier. This is deteriorated by the project based character of the construction industry.

Due to these specific conditions of the public works sector, the only available strategy left for suppliers is the cost leadership strategy.

## 2.3 Value-Price-Cost model

As a framework for analyzing transactions in the construction industry, De Ridder et al. (2002, 2004) have introduced the Value-Price-Cost model (Figure 1). The parameters in this model can be compared to the principles of neoclassical economics. Value relates to the willingness to pay for a certain object. In theory, the cost is the minimum amount a producer is willing to accept. The price is somewhere in between value and cost, dividing the total benefit into a consumer surplus and a producer surplus.

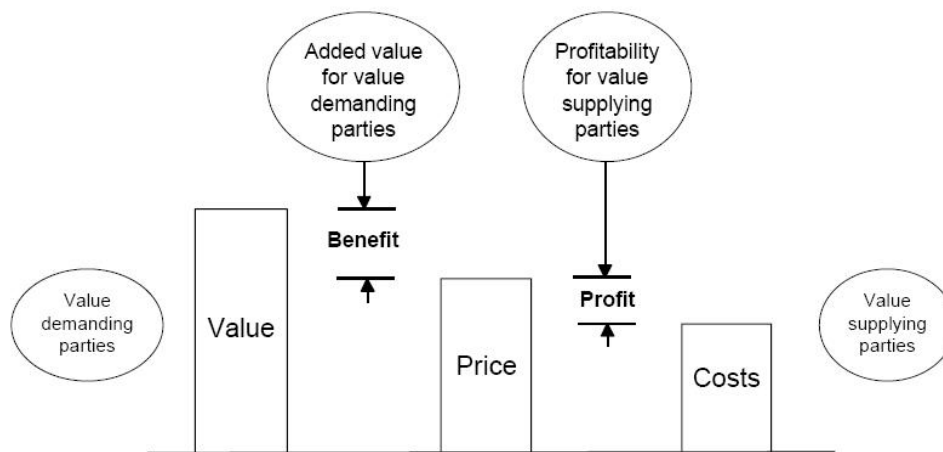


Figure 1: Concept of the Value-Price-Cost model

How to determine the value or “willingness to pay” is subject of this investigation.

## 2.4 Illustration of economically most advantageous tender

To illustrate the concept of selecting based on the economically most advantageous tender, Figure 2<sup>1</sup> has been constructed, using the concepts introduced in section 2.3. The economically most advantageous tender has to be located in the procurement space. The procurement space has three limits, which are all determined by the client; the ultimately available budget, the minimal value to price ratio and the minimal required value. The tender with the highest value to price ratio is the winner.

In this procurement system, suppliers are stimulated to think in the interest of the client and create value, one way or the other. Suppliers will need to anticipate on and interpret the question of the client; they need to imagine and ask what is of use to the client and think in the interest of the client and act accordingly; for most suppliers in the construction industry this will require new competencies.

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<sup>1</sup> Note: it can be argued that this graph can be rotated 90 degrees clockwise, in order to conform to normal reading conventions. The authors have not chosen to do so since this picture is part of a larger graph of the section Building and Construction Processes of Delft University of Technology, with the dimension cost on the right side.

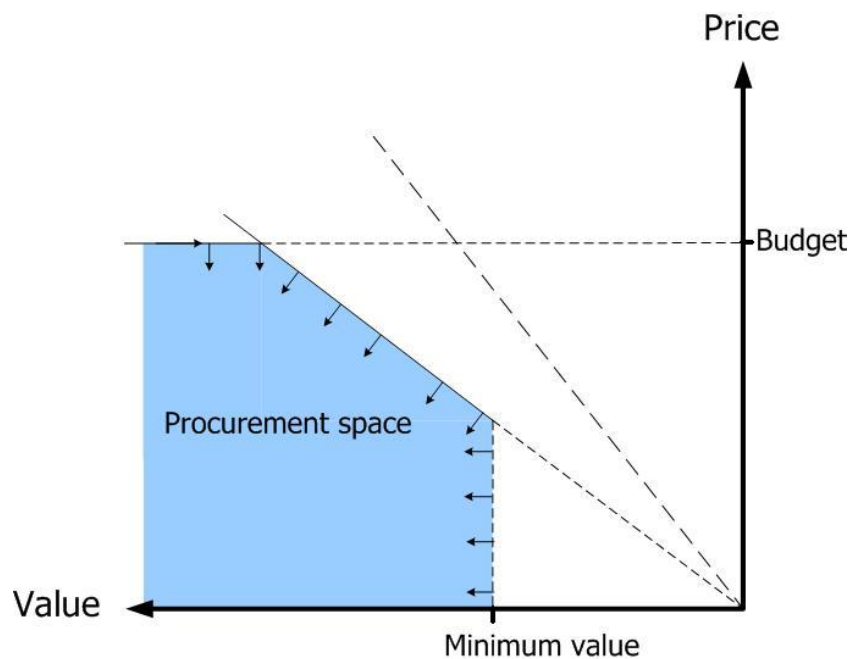


Figure 2: Economically most advantageous tender is measured by Value to Price ratio

It should be noted that economically most advantageous tender can also be used in a broader sense provided the word “tender” is replaced by the term “alternative”. Selection based on the best value to price ratio should not only take place during procurement, but also during the phases of feasibility, design and use. When used in this broader sense, selection on economically most advantageous tender can play a role in the dynamic control paradigm.

The dynamic control paradigm is proposed to improve the Dutch construction industry (de Ridder, 2002, 2004). Under the dynamic control paradigm, client and supplier cooperate and an initial value to price ratio is agreed upon. In this regard the design is not fixed in the beginning because it is clear to all parties involved that the design will change in due course of the project. If changes occur, both parties will continuously try to find ways to maintain or even increase the value to price ratio. In order to be able to do this the measurement of value is needed.

### 3. THE RESEARCH

#### 3.1 Purpose of this research

As described in section 2 there is a need for another way of competition in the Dutch construction industry, especially in the public sector. Instead of competition based on lowest price, suppliers should be able to apply the differentiation strategy. Theoretically this will mobilize and stimulate the creativity of the suppliers to match their production possibilities with the client needs. In theory, a selection based on the economically most advantageous tender will contribute to this end, but in order to determine the economically most advantageous tender, public clients will need to quantify (their) value in a justifiable, transparent and objective way.

As a first step towards a system for quantification of value, an explorative research into value quantification methods called the Quick Scan has been carried out. The Quick Scan has searched for value quantification methods and has examined the concept of value itself.

### **3.2 Research Method**

Several research questions were formulated. The answer to these questions were sought via literature research, expert interviews (professionals originating from developers, public principals and knowledge institutes) and workshops in cooperation with several parties from the Dutch construction industry (two public clients, two knowledge institutes and two contractors were involved). A project team carried out the research and their work was evaluated by a steering committee.

## **4. RESULTS OF THIS RESEARCH**

### **4.1 Definitions of value**

The literature survey revealed research a lot of definitions of value as well as the meta-analyses about value were encountered (Bastiat, 1850) (Saxon, 2005) (Kamann, 2003) (Ramsay, 2005) (Boon, 2001) [URL 1]. In an earlier publication authors of this paper reported three general categories of value definitions; value as some absolute quantity, value as a ratio between the level of benefit and the price or value as the difference between the total benefits and the price (Dreschler, 2005).

The economics definition applies to this investigation. This does not mean the economical science can provide one single definition of value. A glance at the economical literature indicates that since the time of Adam Smith, the concept of value has been a popular subject for discussion.

In classical economics, value refers to "the innate worth" of a commodity. The value of a product is determined by the cost of production input (Smith; Ricardo; Malthus; Mill; Marx) [URL 4]. In another classical tradition, Marx distinguished between the "value in use" (use-value, what a commodity provides to its buyer), "value" (the socially-necessary labour time it embodies), and "exchange value" (how much labour-time the sale of the commodity can claim, Smith's "labour commanded" value).

In neoclassical economics, the value of a product is determined by the relation between cost and subjective factors [URL 5]. There is no value intrinsic to objects or things and value derives entirely from the psychology of market participants. Economists such as Ludwig von Mises asserted that "value" was always a subjective quality. Thus, it was false to say that the economic value of a good was equal to what it cost to produce or to its current replacement cost.

In this research, the value of a product, effect or project proposal is a subjective quality which is determined by to which extent the product, effect or proposal fulfils the needs of the evaluating subject.

### **4.2 Value concepts and quantification methods**

Via literature survey, expert interviews and workshops a list of value concepts and corresponding methods has been collected. These concept and methods were placed on a list which became known as "The Matrix". The list is too large to be included in this paper, but to provide a general idea, the heading of the matrix is included (Table 1).

This table is included to demonstrate that for each value concept more than one quantification method is possible. For each method, there is room for several characteristics.

Table 1: Table heading of the value concepts matrix

Value concept Description	Usage By whom?	Method + Source	Explanation + Remarks	Scale				
				Nominal	Ordinal	Interval / Ratio	Monetary	Accepted?

## 5. CONCLUSIONS

### 5.1 Discussion about the concept of value

During the Quick Scan project, a lot of effort went into discussing the concept of value, associated terms and the role which it should play in the continuous effort to improve procurement and co-operation, especially in the public sector of the Dutch construction industry. It became clear that when talking about value, it's easy to have ambiguity about the concept of value, so it is important to come to a common understanding of the concept.

Furthermore, it became clear there is not an "intrinsic" or "objective" value. Value is always subjective. In a free market, transactions only occur because subjects have a different value perception of the product they are trading. What can be of great value to one person, can be worthless to another. It can even be said that the different value estimation or perception by economic actors is the corner stone for the economy.

### 5.2 Multitude of value estimation methods

A multitude of value estimation methods was encountered. To illustrate the different outcomes that these value estimation methods can produce, they have been applied to the case of a chestnut tree, which has to move because of the construction of a road.

Table 2: Example of estimation methods (proxies, shadow prices)

Value concept	Estimation method
Recovery value	The cost for transplantation of the tree
Replacement value	The total cost of purchase of a piece of land, replanting, years of maintenance, compensation for emotional damage
Production value	O <sub>2</sub> production, CO <sub>2</sub> absorption, production of chestnuts, leaves and shade
Environmental value	The function of the tree in a habitat
Recreational value	The effort day-trippers put up with in order to enjoy the tree (hourly wage * time)
Execution/liquidation value	Selling value timber +/- expenses
Cultural value	Cost + time an action committee puts up with in order

	to preserve the three
Market value	The price the three would yield in an auction
Historical value	Comparison of costs made in the past for comparable threes
Juridical value	The value for threes as appears from legislation/jurisdiction
Emotional value	The influence of the presence of the three on the psyche and wellbeing of persons, expressed in euros. Possible estimation methods: - Evaded costs caused by sickness - Change in production output of persons - The cost of replacing matters which increase wellbeing

With a little extra brainstorm, probably even more valuation methods can be found. This approach can also be applied to other projects and effects which are more relevant to the construction sector.

As shown by this example, the lack of valuation methods or tools is not the problem. It is the multitude of estimation approaches, the uncertainty on the authority of these methods and the ad hoc character of the application of these methods, which hampers value quantification.

So there is a need “best practices” in the field of value estimation. The best practices provide the answer to the question of the most appropriate method to use, as well as how and when.

### 5.3 Best practices

For some situations, best practices have been found. In the Netherlands for instance, the so-called “OEI leidraad” [URL 3], which was developed by leading economists by order of the Ministry of Public Works, is an accepted guideline for performing cost-benefit analysis of large infrastructure projects. But even then, the quantification of value is no hard science. There is plenty of room for interpretation and the result of the cost-benefit analysis will always depend on the made assumptions made.

Decision flowcharts which point out when what estimation method is to be used were encountered as part of the environmental economy literature (Ruijgrok, 2004; Pearce, 2002).

During the interviews, several point systems were encountered which had been used to establish the economically most advantageous offer. This led to the impression that the shift towards selecting the economically most advantageous offer instead of selecting based on lowest price is already taking place. Suitable (point-) systems are being developed and gain legal momentum. Besides the lowest price, quality aspects enter the equation for selection and the influence of these criteria is becoming more and more important. Thus the possibilities for suppliers to distinguish themselves from their competitors seem to be increasing.

## 6. RECOMMENDATIONS

Considering which definition is being used is utmost important in order to prevent disruptions in communication when using the concept of value in a discussion or negotiation. In the context of this paper, the use-value occurs when a need or the wish of a client is fulfilled. The exchange value is the price for which a product changes owner. The total value for the client is determined by the expected use-values over the lifecycle of the product plus the residual exchange value at the end of the life cycle minus the additional costs.

When performing a cost-benefit analysis of large infrastructure projects, adhere to the principles of the “OEI leidraad”– a guideline for project appraisal, Outline Effects Infrastructure. The principles mentioned in the guideline can also be used for establishing the relative importance of design criteria, but for the more detailed design criteria, best practices still need to be found or developed.

Bringing the maturity of point systems to the next level. Point systems have been found as means of quantifying client-specific values. These systems seem to facilitate selection based on economically most advantageous tender and enable the desired differentiation strategy. So the use of these methods needs to be encouraged and promoted. An analysis of used points systems will provide insight in which functionalities are seen as interchangeable, how functionalities are quantified, why it is done in this way and whether the point system has contributed to success in terms of total benefit or not. Based on these insights, improved point systems can be developed. Because the point systems have been applied in practice, insight is gained into what extent they comply with the regulation.

The Centre for Procurement Expertise of the Civil Engineering Division of the Directorate-General for Public Works and Water Management has shown a very keen interest in this latter recommendation.

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