

# ASSESSING THE FEASIBILITY AND USE OF TARGET VALUE DESIGN IN SOUTH AFRICAN CONSTRUCTION

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## ABSTRACT

Target value design (TVD) is a management practice that is undertaken to deliver customer needs within agreed performance parameters. However, the norm in construction for many years has been the compilation of costing / estimation data after design is in place. This practice is evident in South Africa construction where the vicious cycle of design-estimate-construction-rework-estimate continues unabated.

Thus, the need for this research stems from efforts to optimise the value delivered to clients without escalating project cost. The phenomenological research design for the study enabled the collection of data through face-to-face interviews of twenty-four construction professionals with a structured protocol. The study shows that aspects of TVD are already in use in South Africa, though not labelled as TVD. The concepts of TVD are not unknown in practical terms in South Africa. What is missing is the full implementation of the system so that the tide of cost overrun that is synonymous with projects will be reduced.

## KEYWORDS

Construction, Cost, Target Value Design, South Africa

## INTRODUCTION

Ballard (2011) says that target value design (TVD) is a management practice that aims to deliver exactly what the customer needs in terms of value within stipulated project constraints. As a lean construction tool, TVD shifts the basic thinking within a project, from expected costs to target costs (Ballard, 2011, Rubrich, 2012). This tool requires a change in traditional project estimating practice, which is mostly used in South Africa where cost management outcome in construction projects is a problem (Baloyi and Bekker, 2011). A practice that has the ability to negate the proliferation of cost overrun is required in South Africa. Such a practice could reverse the method of estimating costs for specific projects. The cost estimating practice should aim to deliver maximum value to clients by collaboratively designing a project based on allowable

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cost / budget of the client (Rubrich, 2012). In other words, in TVD, the design follows the allowable cost / available money instead of the cost following the design as in traditional cost estimating practice.

Given that the traditional cost estimating practice has, among other, provide situations where client satisfaction are compromised by contractors through opportunism (Emuze et al., 2013), it is important to seek remedy through the lean construction approach that emphasise increasing value and satisfaction delivered to clients. Seeking a remedy thus led to the compilation of a central research question, which says that “is TVD a familiar concept in South African construction, and if yes, would it be practical and feasible to implement it.” Thus, the purpose of this paper is to present the findings of an exploratory study that assessed the familiarity, feasibility, and possible application of TVD in South African construction.

The next section of the paper is a succinct discourse on TVD in construction, which follows a highlight of the research method. The findings of the phenomenology study are presented before a discussion on the efficacy of TVD is used to provide a platform for the concluding remarks of the paper.

## AN OVERVIEW OF TVD IN CONSTRUCTION

TVD is an adaptation of target costing, which is a Japanese management practice that has been introduced into the construction industry (Do et al., 2014). It is a tool that requires collaborative involvement of clients in discussions that with the project team. This is necessary in order to establish the value required by the client (to ascertain the basis of the design), allowable cost for the agreed value and the schedule of the project (Rubrich, 2012). The tool is aimed at counteracting the down sides of the traditional practice of design-estimate-rework as illustrated in Table 1 (Ballard, 2011, Macomber et al., 2007). Table 1 show that TVD as a tool promote design-estimate-redesign practice, which enables the compilation of a detailed estimate that is in line with the design that can be constructed with available fund. For this practice to succeed, all members of the construction supply chain have to have a say so that rework can be avoided. In essence, TVD as a tool can be implemented within an integrated project delivery (IPD) team model (Rubrich, 2012). As opposed to the traditional practice shown in Table 1, TVD tool requires the establishment of clients’ expectations before detailed designs are compiled. Likewise, it requires that constant and transparent collaborative information sharing is stimulated between designers and builders so that expected cost will be less than the allowable cost of a project (Rubrich, 2012).

Table 1: TVD versus traditional practice of estimating project cost

<b>TVD</b>	<b>Traditional practice</b>
Design-estimate-redesign	Design-estimate-rework
First a detailed estimate is built up then a design is made in line with the estimate	Architect/civil/structural designs are drawn up then an estimate is built up
Design is based only on what is possible to construct	An evaluation of the design for constructability might be necessary
All designers are involved from the initial design (architect, engineers, landscape.....etc.)	Architect designs then the other designers base their designs on the architect’s design

Sources: (Macomber et al., 2007, Ballard, 2011)

However, it is notable that there are basic elements that have to be in place before TVD can become an effective costs control tactic. These elements include (Macomber et al., 2007):

- Promote extensive consultation with clients to determine the target value.
- Ensure the design team constantly leads the way in learning and innovations.
- Base the design on a detailed estimate.
- Ensure collective planning of execution so that work packages are ascertained.
- Approve completed work based on design.
- Ensure the design follow the sequential order of construction.
- Work in small a manageable team that allows varieties of views.
- Work in a room big enough to house all the teams.
- Constantly review work done and create an environment advantageous to reviews at random times.

These concise explanation on TVD indicate that it is a tool that creates a common financial goal that rely on teamwork; and allow the team to evaluate activities with the sole aim of eliminating waste in the design-estimate-re-design continuum (Rubrich, 2012). It is equally reported to be a catalyst for project success when teams work together collaboratively without relying on traditional practice of design-estimate-rework (Macomber et al., 2007). Beyond collaboration and transparency, TVD could engender a range of benefits (Table 2). As an illustration, it is often an uphill task to obtain accurate working cost of a project. But such project cost could be compiled to align with market price so that the final product would be competitive. In fact, the tool could enable the calculation of credible financial feasibility for building projects.

Table 2: The reported ‘pros and cons’ of TVD

<b>Advantages</b>	<b>Disadvantages</b>
The costs are worked to be contained within the market price, making the product competitive	It is very difficult to obtain working accuracy of the target cost
There can be no loss upon realisation of the cost goal to achieve within the selling price	Essential costs may be compromised and lead to loss. These compromises may come with the anxiety to contain costs within target
More credible financial feasibility can be calculated	Incurred costs may be different, leading to under or over costing

Source: (Ballard, 2011)

Given the clear and collaborative environment in which TVD could flourish, it is used within an IPD project (Rubrich, 2012), and it is feasible when clients are willing to engage the project team in design and construction processes to ensure appropriate controls are in place. The literature even shows that TVD could be incorporated into other methodologies, apart from IPD. A broader application of TVD known as whole-life TVD arises from the integration of life cycle costing (LCC) and TVD. This approach involves facility operation and user cost, beyond first costs. This broader application encourages comparison of LCC impacts of design alternatives at the design phase. The approach provides project actors with the monetary information on the trade-offs between design and operational decisions so they can make design decisions that improve LCCs (Ballard, 2011).

Therefore, studies have shown that TVD provides an ‘integrated’ method to facilitate a collaborative LCC assessment process by increasing the level of shared

understanding and communication among stakeholders when the method is used iteratively (Russell-Smith et al., 2015).

## **METHODOLOGY**

The location of this study is Bloemfontein in the Free State province of South Africa. The primary data were collected from 24 professionals who were employed by construction firms and consultancies in Bloemfontein. The interviewees include four architects, five contractors, ten quantity surveyors (cost estimators), and five project managers, who were purposively selected based on their project involvements. Interviews were requested and scheduled based on the availability of the interviewees. The face-to-face interviews were conducted at the offices of the participants in the month of August 2015.

All interviews were tape recorded, transcribed and entered into field notes. The interviewees were all university graduates that are exposed to project costing in their professional practice in the construction industry. Twenty-one of the interviewees have been in the industry for over 5 years and six of them have more than ten years of active work experience in the industry.

The interview protocol was structured and it comprises of three sections. Section one was about background information while sections two and three addressed the research questions of the study. The use of a structured protocol is appropriate in this study because it enhances responses to pre-determined insights from the literature, apart from its potential to assist in the compilation of logic models, if such models are required (Gugiu and Rodriguez-Campos, 2007, Grindsted, 2005).

## **THE DATA AND RELATED DISCUSSION**

As mentioned earlier, the research questions guided the interviews and the sub questions that were asked relied on the findings of the literature. As a start in each interview, an explanation and definition of TVD was provided to interviewees so that ambiguities could be eliminated.

The description of TVD as a management practice that aims to deliver exactly what the customer needs in terms of value within the project constraints of cost, time, regulations, and location (Ballard, 2011), was used in the interviews as it was inserted at the start of section two of the structured protocol. The costing related lived experiences of the interviewees were recorded and are herein presented sequentially.

*Question 1: What management practice do you use to deliver exactly what the clients in your projects demand?*

This broad question was used to assess the knowledge of TVD among the interviewees. Three sub questions assisted in the discovery of the extent of knowledge among the interviewees. These questions asked the interviewees if they know what target value is (S-Q1), if they have heard about the term 'TVD' before the interviews (S-Q2), and if they have used / encountered the application of TVD on their projects (S-Q3).

These sub questions were derived from Table 1 of this paper by mixing the attributes of both TVD and the traditional process of project estimation. Table 3 shows that slightly more than half of the interviewees perceive that they do know what TVD is and they have heard about it through readings incidental to continuous professional development (CPD), for example. However, it is notable that only seven interviewees

opine that they may have encountered TVD on their projects. These observations show that the ideas of TVD may not be totally novel to the interviewees. In terms of knowledge of TVD, the interviews indicate that awareness is not so limited in South African construction that is yet to embrace lean construction in practice.

Table 3: Perceived knowledge of TVD among the interviewees

Category	S-Q1		S-Q 2		S-Q 3	
	Yes	No	Yes	No	Yes	No
Architects	3	1	4	nil	3	1
Quantity Surveyors	5	5	6	4	1	9
Contractors	2	3	3	2	2	3
Project Managers	3	2	3	2	1	4
Total	13	11	16	8	7	17

*Question 2: Based on your current management practice in construction projects, please select the practice that you mostly encounter in the box below? Please click either a yes or no.*

The responses to the sub questions of Question 2 are tabulated in Table 4. The questions were compiled through the use of the advantages and disadvantages of TVD shown in Table 2. The table is informative and it sheds more light on the perceptions expressed in Table 1.

In particular, while most of the interviewees (19 of them) were of the opinion that they practice design-estimate-re-design, their thinking may be on the traditional approach as opposed to TVD. This insight is supported by the fact that only six of the interviewees agreed that a detailed estimate is built up before detail designs are compiled. Following the estimate-design continuum is akin to the intent of TVD and most of the interviewees do not practice such approach.

In addition, Table 4 shows that ‘design based on what is possible to construct’ are split into two camps within the interview sample and a similar trend is recorded for the involvement of all designers from project initiation. More notable is the fact that almost all the interviewees (20) appear to identify with the ‘design-estimate-rework’ practice.

The responses to the last sub question also confirm that the current practice of the interviewees tends towards the traditional cost estimating practice instead of TVD given the observation that all of them concur that ‘architect designs, then the other designers base their designs on the architects design’. The veracity and / or reliability of the response to sub question 1 in Table 4 by the interviewees require further interrogation.

Table 4: Current management practice among interviewees

Practice	Responses	
	Yes	No
Design-estimate-re-design	19	5
First a detailed estimate is built up then a design is made in line with the estimate	6	18
Design based only on what is possible to construct	12	12

All designers involved from the initial design (architect, engineers, landscape.....etc.)	11	13
Design-estimate-rework	20	4
Architect/civil/structural designs then an estimate is built up	17	7
An evaluation of the design for constructability might be necessary	16	8
Architect designs then the other designers base their designs on the architects design	24	0

*Question 3: Based on your current management practice in construction projects, please select the outcomes that you mostly encounter in the box below? Please click either a yes or no.*

Given that the perceptions illustrated in Table 4 tend towards the traditional practice, the observations tabulated in Table 5 can be deemed to be supportive of previous comments. Table 5 shows that in general, the interviewees agreed that actual costs differ from initial projections at the starts of projects, although costs are mostly compiled based on market prices. Also notable is the view that in current practice where design is leading cost (or rather cost follow design), essential cost elements may be compromised to the detriment of the interest of the project and even the client. The other outcomes are also significant as most of the interviewees were in agreement with them, especially when one has to consider the difficulty involved in making sure that target cost is accurate.

Table 5: Outcomes of current management practice as perceived by interviewees

Outcome	Responses	
	Yes	No
The costs are worked to be contained within the market price, making the product competitive	20	3
There can be no loss upon realisation of the cost goal to achieve within the selling price	17	7
More credible financial feasibility	17	7
Very difficult to obtain working accuracy of the target cost	16	8
Essential costs may be compromised and lead to loss. This may come with the anxiety to contain costs within target	19	5
Incurring costs may be different leading to under or over costing	21	3

Table 3-5 shows that although most of the interviewees are using the traditional practice of project costing, there is a possibility for a shift in practice because they appear to be open to elements of TVD in practice.

*Question 4: Based on our discussions so far, please indicate your perceptions on the feasibility and implementation of Target Value Design in South Africa by answering the questions in the box below?*

Table 6 indicates that it may be possible to implement TVD where the interviewees are involved in a project as most of them (23) were willing to try the tool in practice and a majority (21) perceive that its application is feasible. In fact 20 interviewees note that they would recommend it to prospective clients, although 17 of them recognize the

difficulties that would accompany a change in common practice. In general, only three interviewees say that TVD may not add value to the local industry in Bloemfontein, South Africa.

Table 6: Perceived feasibility of TVD use in South African practice

Query	Responses	
	Yes	No
Would you be willing to try out this method	23	1
Do you think it is feasible	21	3
Would you recommend TVD to a client	20	4
Do you believe it is difficult to change common practice?	17	7
Do you think TVD would add value to the local industry?	21	3

Beyond the ‘yes or no’ questions, the interviews were requested to comment in broad terms on a range of questions. One of such questions put forward to them was to gauge their opinion about the criticality of factors pertaining to cost, duration / time, and design of a construction project. The feedback from the interviewees was a 50 / 50 split between cost and design. And when further asked to comment on whether one should design to a budget or compile cost to a design, 16 interviewees prefer the former, which is aligned with the intent of TVD. One of the key elements of TVD is for one to design to a budget instead of designing and then costing the design. When this element was posed as a question the results came back as two-thirds of the respondents being in favour of designing to a budget. However, 15 interviewees perceived that the TVD tool would be more suited to private projects. Perhaps, this particular perception is based on the well-known practice of using the traditional / conventional project delivery method for public works in South Africa (Emuze and Smallwood, 2012).

## **EFFICACY OF TVD IN CONSTRUCTION**

To address the efficacy of TVD in construction is to attempt a response to ‘have TVD been proven in construction’. This question asked by a reviewer of the abstract for this paper is relevant and it can only be answered by highlighting findings of TVD case studies in the literature. A scan of the literature would attest to the view that most of the case studies on TVD emanate from the USA (Ballard, 2011, Ballard, 2012, Do et al., 2014, Rybkowski et al., 2012, Zimina et al., 2012) and it is only recently that inroads are been made elsewhere, the United Kingdom (UK) for example (Kaushik et al., 2014). These case studies provide evidence that TVD is a lean construction approach focused on delivering value to clients by promoting a better control over final project cost. In the projects showcased by these case studies, designing to target cost, controlling waste in all forms, and reviewing the design process so as to use various options that reduces time constitute major elements of TVD in construction. Among the case studies, the work undertaken in conjunction with Sutter Health, a client in the USA, provide reasons to further explore the use of TVD in construction (Zimina et al., 2012).

The cost performance of 12 TVD projects (Lee et al., 2011) is at variance with documented cost overrun encountered in similar projects that are not based on TVD – traditional estimating practice, which has been labelled as either planning fallacy or strategic misrepresentation (Bruzelius et al., 1998, Bruzelius et al., 2002, Flyvbjerg, 2008, Flyvbjerg, 2009, Priemus et al., 2008). In one of the case studies, the Fairfield

Medical Office building, recorded an 18.6% actual cost below the benchmark (Zimina et al., 2012). Such performance is a rationale to apply TVD in projects and the preliminary reports from the UK appear to be encouraging (Kaushik et al., 2014). However, mainstreaming TVD would have to overcome certain challenges, which inter-alia include (Zimina et al., 2012):

- The lack of a verifiable basis for client's determination of the worth of an asset and corresponding allowable cost;
- Accurate benchmarking of project cost against market prices, and
- Failure to adjust allowable costs and by extension project budgets in relation to changes in LCC.

In brief, proving the efficacy of TVD is a 'work-in-progress' that is gaining traction as case studies are being reported, not only in the USA, but elsewhere. Through knowledge transfer mechanisms, these case studies could provide grounds for innovative cost management practices in a developing country such as South Africa that must overcome project cost related problems in construction.

## **CONCLUSIONS**

This paper relates the results of an exploratory study on the feasibility and use of TVD in South African construction. In response to the central question of the study, it can be argued that TVD is a relatively familiar concept among the South Africans that were interviewed. Such familiarity may have contributed to the perceptions of the interviewees who contend that it may be implemented in practice in Bloemfontein, South Africa. As highlighted in Tables 3-5, the interviewees were of the opinion that elements of TVD could be discerned though they may not be labelled as TVD in local South African practice.

It is however notable that reported success stories of TVD in the literature is skewed toward particular types of projects (medical /health). Information on wider applications to various project types is needed for evidence based decisions regarding its adoption / adaptation in the construction, especially in developing countries. This reasoning is relevant because project organisation and management in developing countries take place in settings where the decision and action of both internal and external stakeholders with powers that have impact on estimated project cost and the actual project cost is usually unpredictable.

Whereas the study shows the benefits of TVD, which the interviewees were open to adopt and embrace, it should be noted that a change in practice does not come without difficulties. The interviewees recognize this well reported belief and it signals a need to take this study beyond the exploratory stage. A first approach is to distribute / disseminate the findings in a practice oriented forum, perhaps a CPD course for professionals, so that difficulties and their origins can be tackled bearing in mind the intricacies of the South African context.

As part of requirement for continuous professional registration, construction professionals such as the category of the interviewees of this study are mandated to keep up to date with emerging trends in the industry by attending workshops and conferences that bear CPD credits. A further research study should also assess the possibility of developing CDP courses on TVD in conjunction with the South African Council for the Quantity Surveying Professions (SACQSP). Additional evidence would



also encourage practice and this can be provided with the use of either action research or case studies for doctoral research projects. To kick start this process, the first author of this paper started the supervision of two doctoral studies on TVD. One study is focussed on South Africa and the second study is focussed on Nigeria so that the two countries that form the economic hub of the region can lead the way, if TVD is to be mainstreamed in the near future.

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