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# **An evaluation of Cost Performance of Public Projects in the Free State Province of South Africa**

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## **Abstract:**

The primary objective of this study is to identify major causes of construction cost overruns in the Free State Province of South Africa in order to propose effective control measures. The study is based on a review of related literature and a subsequent field work. The survey investigated the factors that have significant effects on cost overruns, especially in the public sector, during the three major phases of a construction project life cycle. Results indicate that the most severe cost overruns causes are inadequate project planning, delays in issuing information to contractors and poor workmanship in term of quality. And the best remedial measures were adequate pre-contract planning, proper implementation, timely resolution of disputes and being quality focus. The level of performance revealed 60% of the projects deviated from the agreed project costs. Practical implication of the findings is that stakeholders need to carefully take into account the factors that influence cost overruns in each stage of the life cycle of the projects that they undertake in the province.

## **Keywords:**

Construction, Cost, Performance, Free State, South Africa

## **Introduction**

One of the challenges facing the construction industry in developing countries is the problem of cost overruns (Chimwaso, 2001). The literature show that the initial tender price is not what is finally paid in most projects? This is because there are many factors that influence cost overruns. This, without saying, results in poor cost performance of construction projects.

It should be noted that a favourable cost performance of any given project depends on the effectiveness of the contract sum (Chimwaso, 2001). The word "effective" according to the Oxford Advanced Learner's Dictionary (2005), means having an effect or producing the intended results. It also means 'actual', as in actual cost of construction works. In construction, however, it is difficult to talk about actual construction cost, that is, the money the client pays the contractor for carrying out the work, until the project has been completed and the final account agreed upon. For this reason, the anticipated final construction cost is always referred to as the projected or estimated final account (Chimwaso, 2001).



Literature has shown that the construction industry, in South Africa in general and Free State province in particular, is not free from the occurrence of cost overruns. This paper seeks to evaluate the cost performance of a number of selected public sector projects in the Free State province so as to identify and rank the major factors that are perpetrating the malaise.

## **Literature Review**

Construction cost overruns can be defined as an extra cost beyond the contractual cost agreed during the tender stage of a project life cycle (Endut *et al.*, 2005). Cost overruns can also be called “cost increases” (Koushki *et al.*, 2005), and “budget overruns” (Zhu & Lin, 2004). Cost overrun is defined as the change in contract amount divided by the original contract amount. This calculation can be converted to a percentage for ease of comparison (Jackson, 1999 cited in Al-Najjar 2008).

### **What are the Causes of Construction Cost Overruns?**

Abdullahi *et al.* (2010) show that cash flow and financial difficulties faced by contractors, contractors’ poor site management and supervision, inadequate contractor experience, shortage of skilled site workers and incorrect planning and scheduling by contractors were significant factors affecting construction cost. Le-Hoai *et al.* (2008) found out that in general, poor site management and supervision, poor project management assistance, financial difficulties of owner, financial difficulties of contractor and design changes are five most frequent, severe and important causes of cost overruns in the construction industry.

Another study that was conducted by Ramabodu and Verster (2010) established that construction cost overruns should be addressed in the Free State province based on the perceptions of respondents that are resident in the region. Furthermore, their research divided the factors on cost overruns into three categories. The categories include very critical factors, moderately critical factors and less critical factors. And of those categories, five factors were considered to be very critical contributors to the manifestation of cost overruns: firstly changes in scope of work on site by the client seemed to be the one with the most influence. In addition, Mahamid and Bruland (2011) conducted research in road construction in the West Bank in Palestine and discovered that the top five influencing factors from consultants’ view are: materials price fluctuation, insufficient time for estimation, experience in contracts, size of contract, and incomplete drawings.

### **Project Cost Management**

The management of costs in a project is a common thread that runs through the entire life of any project. It is cost and financial viability that make a project feasible and the project is not complete until the last payments and paperwork have been completed. The management of costs begins with the financial feasibility study, and then progresses to the costs that are required to purchase the resources needed by the project in the face of adequate cost control measures that are designed to ensure that all work that is done is properly completed (Caruthers *et al.*, 2008).

### **Accuracy of Cost Estimates**

Anyone can come up with a set of numbers. Various critical factors must be identified in order to estimate construction costs effectively. Factors that impact on various project stages (conceptual, design, tendering, and preconstruction stages) should be identified individually to improve estimation accuracy (Cheng *et al.*, 2009). Because preliminary estimates greatly influence subsequent cost management, the accuracy of preliminary estimation work is of critical importance. Therefore, conceptual cost estimate accuracy at the early stage of construction projects has been a major concern and focus of study for the past four decades. Carruthers *et al.* (2008) even describe a cost estimate as only approximations.

### **Implementation of Cost Control**

Oosthuizen *et al.* (1998 cited in Dibonwa, 2008), describe project cost control as a process of gathering, analysing, comparing and monitoring the costs of a project and reporting the results continuously during the development cycle of a project. Keong (2010) elaborates on the fact that 'cost control requires searching out the "whys" of both positive and negative variances'. Cost control must be thoroughly integrated with the other control processes: scope change control, schedule control and quality control. Dibonwa (2008) states that the other risk associated with cost in construction projects is the activity below the ground, and that site history and findings during site investigations provide some degree of realities with respect to substructure design requirements. This uncertain construction activity is, however, renowned as the most vital risk element in most construction projects.

### **Contingency Budget Provision**

Caruthers *et al.* (2008) describe a contingency as an allowance that a cost estimator makes in order to allow for unforeseen costs or to allow for things that may go wrong. Furthermore he says cost contingency reserves are required to be budgeted for. Cost contingency has been defined as "the amount of funds, budget or time needed above the estimate to reduce the risk of overruns of project objectives to a level acceptable to the organization" (PMI, 2004). The first is the expected value of a possible identified event. The second type of contingency is the possible cost of unforeseen events: events that cannot be identified because the engineer does not know what can happen. This second type is a true contingency and the one that needs close attention, because it is a margin for error.

### **Research Methodology**

The research is a pilot study for a treatise that must be compiled for an MTech qualification. The field work entails the use of a questionnaire survey and informal interviews to interrogate the issues in the subject area. A questionnaire was sent out by email or hand delivered to 25 professionals in the Free State construction industry between 27<sup>th</sup> of July and 31<sup>st</sup> August 2012. The sample comprised Architects, Quantity Surveyors, Construction Project Managers, and Engineers. The professionals were consultants from both the public and private sector. 54 causes of cost overruns in all three phases of the project life cycle: planning/design, implementation and completion phases were identified through the literature.



53 remedial cost control measures in all three phases of the project life cycle were also derived from the list of cost overruns factors and discussed with some parties involved in the construction industry. Respondents presented their views by indicating on a 5-point Likert scale, where 1 represented “not frequent cause” and 5 represented “extremely high frequent cause.” The quantitative questionnaire consisted of structured and unstructured questions designed to enable respondents to add any other factor they considered important.

Due to red tape from the Department of Public Works in terms of giving information to third parties, data were collected using purposive sampling from quantity surveying firms. Responses were received from 20 respondents, which constitute 80% of the respondents. The collected data were analysed through calculation of importance index. The formula used to rank the causes of cost overruns and remedial cost control measures based on impact level identified by the respondents is as follows:

$$\text{Importance index} = \sum a / A \times n / N \quad (0 \leq \text{index} \leq 1) \quad (1)$$

Where = the constant expressing weighting given to each response (ranging from 1 not frequent up to 5 extremely high frequent); n = the frequency number of responses to each variable; A = the maximum weight which is 5 likert scale, and N is the total number of respondents. The importance index for all factors and remedial measures were calculated at different stages of the project cycle. The group index was calculated by taking the average of factors under each project cycle.

## Findings and Discussion

For the purpose of this paper only the top five ranked factors are listed. The results obtained from the responses are provided from Table 1 to 3. Inadequate project preparation, delays in issuing information to contractor during construction stage, poor workmanship were indicated as the most severe cost overruns causes by respondents. Adequate pre-contract project coordination, proper project implementation, good workmanship and timely resolution of disputes were indicated by respondents as the best cost control measures to be implemented in the projects.

Table 1: Ranking of factors and cost control measures under Planning / Design phase

Factors	Index	Rank	Remedial cost control measures	Index	Rank
Inadequate project preparation, planning	0.79	1	Adequate Pre-contract project coordination	0.97	1
Inadequate planning	0.77	2	Completed designs at time of tender	0.87	2
Lack of co-ordination at design phase	0.72	3	Comprehensive project planning	0.82	3
Incomplete design at time of tender	0.71	4	Adequate co-ordination at design phase	0.82	3
Procurement and non-related procurement related factors	0.70	5	Adequate Pre-contract Budget	0.81	4
			Appointment of highly experienced technical consultants	0.80	5



The results also indicate that consultants are either rushed to produce documents for the projects or they don't allow themselves enough time to prepare such documents. The respondents equally noted that lack of communication contributes a lot to cost overruns in construction. Furthermore, this lack of communication creates a situation where the contractor makes his own decisions regarding issues, which were raised and feedback was not delivered.

Table 2: Ranking of factors and cost control measures under Implementation phase

<b>Factors</b>	<b>Index</b>	<b>Rank</b>	<b>Remedial cost control measures</b>	<b>Index</b>	<b>Rank</b>
Delays in issuing information to the contractor during construction stage	0.76	1	Proper project implementation	0.83	1
Contractual claims, such as, extension of time with cost claims	0.74	2	Provisions for materials price escalations	0.82	2
Delays in decision making by government, failure of specific coordinating	0.73	3	Timely issuing of information to the contractor during construction stage	0.81	3
Changes in owner's brief	0.72	4	Proper contractor management	0.81	3
Delays in costing variations and additional works	0.72	4	Consistent cost reporting during construction stage	0.80	4
Improvements to standard drawings during construction stage	0.69	5	Timely decisions by the supervising team in dealing with the contractor's queries resulting in delays	0.78	5
Monthly payments difficulties from agencies	0.69	5			
Poor contractor management	0.69	5			
Contractor's instable financial background	0.69	5			

Table 3: ranking of factors and cost control measures under Implementation phase

<b>Factors</b>	<b>Index</b>	<b>Rank</b>	<b>Remedial cost control measure</b>	<b>Index</b>	<b>Rank</b>
Poor workmanship	0.74	1	Good workmanship	0.78	1
Late contract instruction after practical completion	0.70	2	Timely final account agreements	0.75	2
Delay in resolving disputes	0.69	3	Timely contract instruction after practical completion	0.72	3
Delay in final account agreements	0.68	4	Adequate designs	0.70	4
Works suspended due to safety reasons	0.57	5	Minimum errors in the bills of quantities	0.68	5

Figure 1 indicates the results concerning the level of performance of public projects in terms of cost. All projects were general building projects from the Department of Public Works, ranging from offices to public schools. The data were sourced from different quantity surveying firms in the province. In amounts, they ranged from R282 540.00 to R89 885940.89 in original tender amounts, and the durations were from 2 months to 30 months, excluding extension of time. The figure shows that overruns ranged from 11% to 64% among the 4 projects. The reasons cited in the projects were additional work request by the client, extension of time, re-measurements and variations. And none of the remedial measures were applied to the projects.

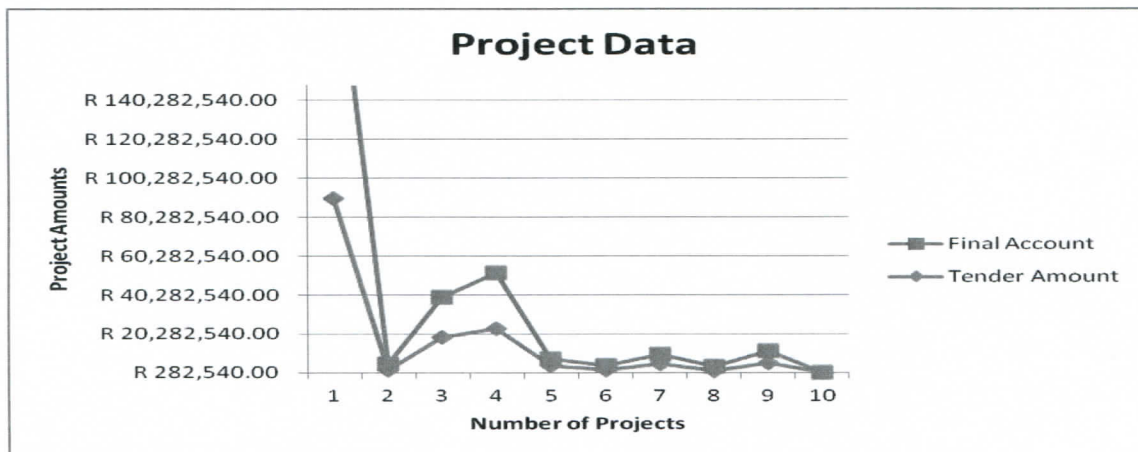


Figure 1: Level of performance of public sector projects

## Conclusions and Further Research

The paper's primary objective was achieved through soliciting perceptions from professionals in the construction industry. The respondents identified factors that contribute to cost overruns and possible remedial measures that could be used to revise the trend. Therefore, although exploratory at best, these findings justify the call to pay attention to cost overruns in the construction industry, especially at the Free State province.

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