

# Challenges to Prevent in Practice for Effective Cost and Time Control of Construction Projects

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## ABSTRACT

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Cost and time control of projects is important in preventing project failure. However, achieving effective cost and time control in practice is often challenging. The challenges of project cost and time control in practice are investigated by carrying out a questionnaire survey on the top 150 construction contractors in the UK followed by in-depth semi-structured interviews of practitioners from 15 construction companies in the country. Quantitative analysis reveals that design change is the most important factor inhibiting the ability of UK contractors from effectively controlling both the cost and time of construction projects. Four of the top five factors inhibiting effective cost control are also the top factors inhibiting effective time control albeit in a different order. These top factors – design changes, inaccurate evaluation of project time/duration, risk and uncertainty, non-performance of subcontractors and nominated suppliers were also found to be endogenous factors to the project. Additionally, qualitative analysis of the interviews reveals 16 key challenges to prevent for effective project cost and time control in practice. These are classified into four categorised based on where they stem from as follows; from the organisation (1. Lack of integration of cost and time during project control, 2. lack of management buy-in, 3. complicated project control systems and processes, 4. lack of a project control training regime); from the construction management/project management approach (5. Lapses in integration of interfaces, 6. project control not being implemented from the early stages of a project, 7. inefficient utilisation and control of labour, 8. limited time devoted to planning how a project will be controlled at the outset); from the client; (9. Excessive authorisation gates, 10. use of adversarial and non-collaborative forms of contracts, 11. communication problems within client set-up, 12. obstructive client representatives) and; from the project team (13. Lack of detailed/complete design, 14. lack of trust among the project partners, 15. limited time devoted to project control on site, 16. non-factual reporting). The study posits that knowledge of these project control inhibiting factors and challenges is the first step at ensuring they are avoided and enable the implementation of a more effective project cost and time control process in practice.

**Keywords:** Cost control, Overrun, Project control, Project management practice, Project success

## INTRODUCTION

Control is the recognised mechanism to prevent project failure and keep a project on track. Even though the importance of project control during the implementation of projects is obvious, research indicates that many construction projects still fail from a cost and time performance perspective. For example, [19] concluded that cost overrun is a global phenomenon as it found that 90% of infrastructure projects in 20 countries and across five continents experience cost escalation. Most studies in this area have concentrated on the magnitude of cost and time



overrun and/or their influencing factors. More focus now needs to be paid to providing deeper insights into the day-to-day practical issues that make effective project control challenging from practitioners' perspective. This is important to make this essential project management activity more effective and avoid project time and cost performance failures.

## LITERATURE REVIEW

Most studies that have sought to provide insights into actions to improve the outcomes of projects have been devoted to professing practices for general project success. There are a variety of factors with impact on project success, according to [12] project managers should not focus on only one factor for project success. For example, [27] revealed that pre-project planning, project change management, and design/information technology are critical practices with important impacts on both cost and schedule performance of projects. Standardised project management tools; leadership skills; and processes has been identified by [36] as factors that have a high impact on project success. On the other hand [6] revealed that clear goals and objectives; support from senior management; and adequate funds/resources were the three-leading critical project success factors. Communication was revealed by [3] as an important criterion for project success. Factors related to commitment and communication and project personal were found by [14] to be favoured by project stakeholders as critical success factors. It has been argued by [21] that project team commitment, client's competencies and contractor's competencies are critical in explaining overall performance of design and build projects. Similarly, coordination among project participants was identified by [11] as the most significant of all factors having maximum positive influence on cost performance of projects. On the issue of performance [32] identified that a contractor's track record for completion on time, affect up to six performance metrics including the time performance of a project. It was found by [28] that smaller, focussed and less-dispersed teams presents better results for project success than multiple, larger dispersed teams. 24 project management practices that are significantly correlated with project performance were established by [33] and recommended that emphasis must be given to scope management to achieve superior project performance. Utilisation of change management practices was highlighted as truly helpful in lowering the proportion of change cost in project actual cost [8]. It was found by [4] that delay incidents usually occur during the construction phase of a project and that one or more of the project partners, is usually a contributor to the delay. Other studies have gone on to specifically develop various techniques that could improve the cost and time performance of projects, for example, milestone assessment technique by [34], flexible work breakdown concept of project control by [21], object-oriented integrated cost data format approach by [22], performance control limit curves and stochastic S-curves technique by [16], project control and inhibiting-factors management (PCIM) model by [37]. A model integrating schedule and cost information with resource information for repetitive construction by [18]. The concept of integration also formed the basis method developed by [1] which integrated earned value management and project risk analysis for project control under uncertainty.

## Justification of the Study

Most studies in the area of project cost and time control have focused on issues to do with critical success factors of projects, many have also been dedicated to looking at the factors causing cost and time overrun not the factors that makes it difficult to control these factors in practice. There seems to be an implicit assumption that the most important factors causing cost and time overrun are also those most difficult to control. This needs to be explicitly validated. Most studies have also not engaged with practitioners in practice to understand the challenges they face in the quest to control their projects therefore; project control techniques are often recommended without additional suggestions in relation to the enabling environment required for their success. There seems to be a premise that project control operates in a vacuum devolved of the project environment. Therefore, there is gap in knowledge in relation to the identification of the challenges of effective control of projects in practice and the provision of deeper insights into the day-to-day practical issues that make effective project cost and time control challenging from practitioners' perspective. This study seeks to add to knowledge in this area by unearthing the challenges to avoid in practice for effective cost and time control in practice.

## RESEARCH METHOD

### Data Collection

The study was conducted using a survey method with questionnaires and semi-structured interviews as the data collection instruments. The first stage of the study involved a postal administration of a questionnaire each to the top 150 construction contractors in the UK, from the building magazine annual league table.

### Interviews

Following analysis of the questionnaires, semi-structured interviews were then carried out on 15 of these leading contractors in the UK. Augmenting the quantitative questionnaire survey with a qualitative (semi-structured interviews) approach is deemed appropriate for this study in view of the objectives of the research, that is, provision of insights into the experiences of individuals in a natural setting. Qualitative research examines events of experiences in context from the perspective of the individuals experiencing the phenomena, an approach that allows the researcher to develop a picture of the whole that can enhance and guide practice (Thompson and Walker. [9]). The interviewees were from a sample of the respondents from the questionnaire survey. They were selected because of their deep experience of working on infrastructure projects and availability for interviews. Most of the interviewees are directors and senior managers with an average professional experience of 26.8 years (see Table I). The same questions were asked in all interviews for objectivity and ease of analysis. The questions were open ended in order to allow practitioners to fully express themselves, albeit in a structured way.

**TABLE I.** INFORMATION OF INTERVIEWEES

Roles	Years*	Company type	Project types	Interview duration
Senior general project manager	30	Main contractor	Construction, civil engineering, nuclear etc.	50 min
Commercial director	25	Main contractor	Building construction, telecommunication, infrastructure, civil engineering	40 min
Director	25	Contractor	Building and engineering services	30 min
Associate director	28	Consultant	Construction	30 min
Senior contracts manager	24	Main contractor	Social housing/regeneration	40 min
Planning director	28	Main contractor	Building, Transport infrastructure, Civil engineering	50 min
Director	45	Consultant	Construction	35 min
Head of planning	20	Main contractor	Building construction	15 min
Regional manager	34	Main contractor	Building, construction and civil engineering	20 min
Director	25	Main contractor	Building construction	30 min
Senior programme manager	11	Consortium	Infrastructure, construction	45 min
Director	40	Main contractor	Building construction and civil engineering	35 min
Head of project planning	20	Main contractor	Building and construction	30 min
Director	22	Consultants and contractor	Construction, infrastructure and engineering	30 min
Director	25	Main contractor	Construction	30 min

\*Number of years of experience in the construction industry

## Data Analysis Approach

The response rate for the questionnaire survey is 45%. Data from the questionnaire were analysed using SPSS. Associative statistics using Spearman rank order correlation coefficient was performed as well as the use of relative importance index as used by [11, 13], for the questions involving ranking. The data obtained from the interviews were analysed manually (aided by a computer spreadsheet) but systematically, as explained by [36]. This involved, first, transcribing and familiarisation with the data. Followed by identification of emerging themes and assigning emerging concepts to the new themes. Themes and concepts were then linked to produce an index in order to provide a hierarchy and grouping. Following this summarisation and syntheses was carried out which allowed for the concise presentation of the information. This was followed by categorisation and classification of the synthesised data that allowed for refinement and assignment of descriptive data therefore enabling the detection of pattern for association. This stage of the qualitative analysis was an iterative process that involved looking through data, recurring themes and searching for association. The final step of the qualitative analysis process involved developing explanations and making inferences from the synthesised, categorised and classified data by utilising common sense to search for explanations or drawing from theoretical concepts.

## FINDINGS AND DISCUSSION

The questionnaire survey seeks to identify the most important factors that inhibit the project control effort of construction projects practitioners. 20 factors that can potentially inhibit effective project cost and time control were identified from literature. These potential project control inhibiting factors are classified according to the source of these factors and shown in Table II. The factors are classified as; exogenous factors; endogenous organisational factors and; endogenous project internal factors.

**TABLE II.** CLASSIFICATION OF THE IDENTIFIED PROJECT COST AND TIME CONTROL INHIBITING FACTORS

Project cost and time control inhibiting factors	
Exogenous Factors	
A	Unstable interest rate
B	Dependency on imported materials
C	Inflation of prices
D	Fluctuation of currency/exchange rate
E	Unstable government policies
F	Weak regulation and control
G	Unpredictable weather conditions
Endogenous Organisational Factors	
H	Low skilled manpower
I	Lack of proper training and experience of PM
J	Lack of appropriate software
Endogenous Project Factors	
K	Inaccurate evaluation of projects time/duration
L	Project fraud and corruption
M	Design changes
N	Financing and payment for completed works
O	Complexity of works
P	Discrepancies in contract documentation
Q	Contract and specification interpretation disagreement
R	Conflict between project parties
S	Risk and uncertainty associated with projects

### Exogenous Factors

These are factors that stem from outside the project environment; these are mostly macro-economic factors and socio-political factors but could also be natural factors. The factors that were identified as making up this group include economic factors like unstable interest rate, inflation of prices, and fluctuation of currency. Other factors in this group include socio-political factors such as unstable government policies, weak regulatory regime, and dependency on imported materials. Although these factors are not directly related to the project but they can affect

the ability to control cost and time of construction projects. For example, projects normally utilise numerous types of materials which will need to be procured but if there is high inflation, the cost of materials may be affected and ultimately the planned cost of a project. Similarly, if weather conditions turned out worse than had been envisaged, it may affect the ability to effectively control the time of a project and ultimately the cost.

### ***Endogenous Organisation Factors***

This category contains factors that are more related to the project than the external environment factors. These factors would not normally stem from implementing the project rather they stem from the project office or decisions made by the organisation in relation to the project. For example if an inexperienced PM is assigned to manage a project, this does not stem from the project rather it is a project office deficiency or if there is a lack of an appropriate project control software that can be used for the project, this may inhibit the ability to effectively control the cost and time of a project.

### ***Endogenous Project Factors***

These are factors that stem directly from implementing the project. Some of the factors in this category include non-performance of subcontractors, design changes, conflict between project parties, inaccurate evaluation of project time/duration etc. They can originate from any of the project parties for example design changes can be requested by the client or the client representative in a traditional procurement route or by the contractor in a design and build type. They can also come prior to the start of construction such as discrepancy in contract documentation, inaccurate evaluation of time or during construction, they can also continue to negatively affect the project even after construction adding to the final project cost e.g. conflict between project parties.

### ***Project time and cost control inhibiting factors***

#### **Questionnaire Design and Analysis**

The questionnaire survey seeks to identify the most important factors that inhibit the project control effort of construction projects practitioners. 20 factors that could inhibit effective project cost and time control were identified from literature. These were presented to respondents who were asked to rank them as either 'extremely important', 'important', 'unimportant' or 'extremely unimportant'. A four-point scale was selected to facilitate the respondents to decide whether a factor is on the important side or the unimportant side of the scale thereby preventing the risk of many factors rated as middle of the scale in a five-point scale system. This four-point scale was converted to a Relative Importance Index (RII) for each individual factor, using the following formula, as adopted by [11]:

$$\text{Relative importance index (RII)} = \sum W \div (H \times N) \quad \text{Eq. (1)}$$

Where  $w$  is the total weight given to each factor by the respondents, which ranges from 1 to 4 and is calculated by an addition of the various weightings given to a factor by the entire respondent,  $H$  is the highest ranking available (i.e. 4 in this case) and  $N$  is the total number of respondents that have answered the question.

### Questionnaire Result - Leading Cost and Time Control Inhibiting Factors

The analysis of the questionnaire response is presented in Table III which shows that “design changes” is ranked by construction contractors in the UK as the leading factor inhibiting not just time control but also cost control of projects.

**TABLE III. RANKING OF FACTORS INHIBITING EFFECTIVE PROJECT TIME AND COST CONTROL**

Inhibiting factors	Time control		Cost control	
	RII	Rank	RII	Rank
Design changes	0.94	1	0.95	1
Risk and uncertainty associated with projects	0.88	2	0.93	2
Non-performance of subcontractors and nominated suppliers	0.88	3	0.84	4
Complexity of works	0.86	4	0.80	9
Inaccurate evaluation of projects time/duration	0.85	5	0.87	3
Unpredictable weather conditions	0.80	6	0.75	12
Discrepancies in contract documentation	0.79	7	0.81	9
Lack of proper training and experience of PM	0.76	8	0.78	12
Low skilled manpower	0.76	9	0.73	13
Financing and payment for completed works	0.74	10	0.82	5
Contract and specification interpretation disagreement	0.72	11	0.81	7
Conflict between project parties	0.70	12	0.80	10
Dependency on imported materials	0.68	13	0.66	14
Inflation of prices	0.63	14	0.81	8
Lack of appropriate software	0.60	15	0.60	15
Weak regulation and control	0.54	16	0.58	17
Project fraud and corruption	0.52	17	0.57	18
Unstable government policies	0.47	18	0.48	20
Unstable interest rate	0.46	19	0.60	16
Fluctuation of currency/exchange rate	0.45	20	0.55	19

Furthermore, it emerged that four of the top five factors inhibiting effective time control also emerged as the leading factors inhibiting cost control albeit in slightly different order. Top of the list for both cost and time control is design changes. Design change is undoubtedly considered the most important factor that affects the ability to control cost and time of construction projects. This is no surprise because design changes will normally have a cost and time implication. If the process of design change is not well managed it will undoubtedly affect the schedule as well as the cost of the project negatively. Frequent and haphazard design change request during a project can often be a major bottleneck to effective control. Another common leading inhibiting factor is inaccurate evaluation of project time/duration. It's no surprise that this is considered a critical time and cost control inhibitor because if the time duration of projects are not accurate then time control is already a lost cause. It then becomes impossible to

effectively control the time of projects and consequentially the cost, because if the work goes on for longer than planned then it will lead to more resources being expended on the project ultimately affecting the cost as well. The other leading factors common to both time and cost control in addition to design changes and inaccurate evaluation of project time/duration are; risk and uncertainty, non-performance of subcontractors and nominated suppliers.

### Similarities between Cost Control Inhibiting Factors and Time Control Inhibiting Factors

The Spearman rank order correlation coefficient was used to statistically ascertain the similarity that was observed in the leading cost control inhibiting factors and the leading time control inhibiting factors. The Spearman rank order correlation was used to test the agreement or disagreement between the two rankings. The Spearman's rank correlation is a non-parametric test. It has the advantage of not requiring the assumption of normality or homogeneity of variance hence it is sometimes called distribution free tests. The test also compares medians and not means and as a result, if the data have one or two outliers, their influence is negated. When dealing with data at the ordinal level, such as ranks, it is important to use a measure of correlation that is designed to handle ordinal data. The Spearman Rank Order Correlation Coefficient was developed by Spearman to use with this type of data. It is a measure of relationship among different parties or factors and the strength and direction of the relationship. The correlation coefficient varies between +1 and -1, where +1 signifies perfect positive correlation and -1 shows a perfect negative correlation or disagreement. The formula for the Spearman rank correlation is given by the equation below:

$$\rho = 1 - (6 \sum di^2 / (N^3 - N)) \quad \text{Eq. (2)}$$

Where rho is the Spearman rank correlation coefficient, d represents the difference between ranks for each case and N is the number of rank pairs. The result of this test is 0.85, a strong positive correlation, indicating a strong agreement between the ranking of time control inhibiting factors and cost control inhibiting factors. This indicates that practitioners' perceptions of the factors that inhibit effective time control are similar to their perception of factors that inhibit effective cost control. This is similar to the finding of [10] who argued that it is difficult to separate the reasons causing overrun into that of cost and schedule concluding that the reasons for cost increases are normally also the reasons for time extensions. Therefore, it can be argued that the factors that inhibit effective time control of projects are also likely to inhibit effective cost control.

Another interesting revelation is that the factors that were ranked lowest as inhibiting cost and time control are also all similar. The five lowest ranked factors for time control are weak regulation and control; project fraud and corruption; unstable government policies; unstable interest rate; and fluctuation of currency/exchange rate. These factors also make up the five lowest ranked factors inhibiting cost control. It is also worthy of note that, in addition to the fact that the leading four factors ranked as inhibiting effective cost and time control are similar, with very similar RII, these leading top four factors are also endogenous project factors from the classification system



suggested in Table II earlier. This is an important revelation showing that the factors that mostly inhibit effective project cost and time control are those that stem from the project. This may seem worrying on the face of it but there is comfort in the fact that these top inhibiting factors stem from implementing the project and within the control of project management. They should therefore be easier to prevent or mitigate during project execution. These leading inhibiting factors would have been more difficult to manage had they been external to the project for example political or social factors. Interestingly, the lowest ranked factors inhibiting effective cost and time control are mainly exogenous factors.

#### ***Reason for Embarking on Project Cost and Time Control in Practice***

First, 100% of the practitioners that were interviewed revealed that they utilise project cost and time controls during their projects. The key reasons given for the utilisation of project controls are; (1) to ensure that the project progresses in an orderly manner; (2) efficient use of resources; (3) to provide and/or obtain information and knowledge of the status of the project; (4) to ensure the project is delivered on time and to budget; (5) good management practice and part of a company's quality procedure and; (6) provide more value to the client leading to client's satisfaction and repeat business.

#### ***Identification of the challenges to Prevent for Effective Project Control in Practice***

The interviews conducted helped unearthed many challenges to the achievement of effective project control in practice. 16 challenges were identified based on an analysis of the interviewees (see Table II). These have been categorised under four themes based on their origin during the project control process. The categories are challenges emanating from; (A) the organisation; (B) construction/project management; (C) the client and; (D) the project team. These challenges are discussed in the following sections.

### **Challenges stemming from the organisation**

#### ***Lack of Integration of Cost and Time During Project Control***

Many practitioners interviewed highlighted this as a major obstacle to their ability to effectively control the cost and time objectives of their projects. One construction executive noted that in his experience of working in the UK, project control in the 'real sense' does not exist because it can only work if cost and time are integrated but this is not always the case in practice. Another interviewee commented as follows:

“...project controls... pretty much everywhere I've been, there has been a little office with the planners (schedulers) in, there has been a little office with the cost or commercial people in and never the two shall meet...”

The above should be avoided to achieve effective project cost and time control because a lack of integration of time control with the cost dimension of the project would not yield the necessary information needed to effectively act on a project. To buttress the importance of integration of cost and time during project control, research have found that there is a strong relationship between cost and time for example, [17, 27] also used the integration

principle of cost and time to develop a time-cost trade-off model that helps determine the shortest project duration with minimum total project cost.

### ***Lack of Management Buy-in***

It was also revealed that senior management of some companies often do not appreciate the benefits of a project control system, and consequently do not give support to instigating a dedicated project control culture in the organisation. One of the interviewees, a director responsible for project control, commented as follows:

“I am a real advocate of earned value and project controls and the likes; it will stop as soon as I try to implement it, if it’s not sponsored at a high level...”

A lack of management buy-in and lack of a project control culture in an organisation will often lead to project control being implemented half-heartedly and limited investment and training. Hence it is essential that management create a project control culture among all employees and provide all the support and encouragement needed. This is also supported in literature for example [30] showed that top management support is significantly more important for project success than any other factor. It was revealed by [29] that top management support is important for project success especially outcome control, cost and time control the focus of this paper are aspects of outcome control.

**TABLE IV. CHALLENGES TO EFFECTIVE PROJECT COST AND TIME CONTROL**

Challenges categorisation	Identified project cost and time control challenges
Organisation	1. Lack of integration of cost and time during project control. 2. Lack of management buy-in. 3. Complicated project control systems and processes. 4. Lack of a project control training regime. 5. Lapses in integration of interfaces.
Construction management/ Project Management	6. Project control not being implemented from the early stages of a project. 7. Inefficient utilisation and control of labour. 8. Limited time devoted to planning how a project will be controlled at the outset. 9. Excessive authorisation gates.
Client	10. Use of adversarial and non-collaborative forms of contracts. 11. Communication problems within client set-up. 12. Obstructive client representatives.
Project Team	13. Lack of detailed/complete design. 14. Lack of trust among the project partners. 15. Limited time devoted to project control on site. 16. Non-factual reporting.

### ***Complicated Project Control Systems and Processes***

The study revealed that quite often organisations put in place project control systems and processes that are complicated and end up being a bottleneck. They are sometimes considered burdensome and utilised half-heartedly. Consequently, the necessary information and data essential to achieve effective project control are often not

up-to-date, inaccurate or unavailable leading to futility of project control efforts. One of the practitioners interviewed noted that although construction is a relatively straight forward process, some systems overcomplicate things, and the site and construction management staff that utilise the systems do not like highly complicated systems. According to [31] a small number of simple EVA metrics and indices are more effective at communicating performance of the project than a large number and complicated ones.

### ***Lack of Project Control Training Regime***

This challenge relates strictly to the quality of training and knowledge that the people working on the project have about project control. Practitioners believe project control would be more effective if construction and project management staff understood the science of project control better than they currently do. This is because many of them think project control is just about Gantt charts and do not understand the issues to do with earned value analysis, progress analysis, s-curves, etc. An organisation that is serious about delivering projects effectively should not only put in place the necessary project control systems and processes but will also need to provide the necessary training needed to correctly implement them. It was argued by [31] that adequate training of all members of the project team, including the contractor, is crucial in the smooth operation and use of project control systems.

## **Challenges Stemming from Construction Management/Project Management Approach**

### ***Lapses in Integration of Interfaces***

It was revealed that practitioners often find it challenging to integrate the different interfaces of a construction project which often makes project control difficult. It was further revealed that the numerous interfaces that often characterise construction projects are not insurmountable, although the challenges it presents cannot be underestimated. To mitigate this in practice, adequate planning is important as the study reveal that this is often lacking in the haste to start projects early. Adequate planning will reveal complex interfaces therefore allowing better preparation on how these interfaces will be controlled. Koga et al (1999) established that integration during the planning and design phase of a project is a key determinant for construction budget and schedule success.

### ***Project Control not being Implemented from the Early Stages of a Project***

The study also found that site management often do not pay much attention to the project progress and performance at the early stage, believing that there is still enough time. This will subsequently lead to a frantic rush to finish the project through acceleration which inevitably impact negatively on project control and quite often increase the project cost. An interviewee elaborately sums it up as follows:

“...there is a tendency we most have that if you start a project...that it doesn't matter if there is any slippage at the beginning but of course as you get towards the end that end date can't go out, then that slippage becomes critical...”

This can be mitigated by monitoring, reporting and taking corrective actions as necessary, right from the outset. This will ensure that potential project problems are revealed earlier and controlled in an orderly and systematic manner.

### ***Inefficient Utilisation and Control of Labour***

The study showed that site management often find it difficult to effectively control labour efficiently and this negatively affects the project control process. In the literature, it was concluded by [25] that less emphasis is given to resource allocation and its cash-flow implications in construction. Interviewees revealed that labour usage on construction projects is not often efficiently managed and utilised as planned. Since construction projects are usually labour intensive, not being proficient in the management of labour will often have a detrimental effect on effectively controlling their duration and cost.

### ***Limited Time Devoted to Planning How a Project Control Will be Controlled at the Outset***

It also emerged that practitioners often fail to plan how a project will be controlled before commencement of the project. This often leads to an unstructured and non-systematic project control effort which does not bode well for effective project control. The main reason for this according to analysis of the interviews is that, quite often there is not enough lead-time from when a contract is awarded to starting the project. This leaves a very limited period for the project team and management to plan how the project will be controlled; it also hinders the installation of the necessary processes and systems that will ensure effective project control. The statement below from one of the practitioners explains this. “The period between tender receipt and start on site are very often telescoped ... things get rushed and...if you telescope the period between tender receipt and start on site, all you are doing is building up problems...”. Similarly, [20] found that a failure to properly carry out detailed pre-project planning could severely impact the cost and schedule performance of capital projects.

## **Challenges stemming from the client**

### ***Excessive Authorisation Gates***

It was revealed that some of the authorisation gates that clients have designed into their project management processes can often be detrimental to effective project control. The reason for this is that quite often, time is spent waiting for approval from a manager that may not be part of the project team and decisions that are by no means strategic cannot be made by the project team. One of the interviewees pointed out that during the implementation of projects for a client, solution authorisation by the client and scheme budget approval is often a bottleneck to the cost and time control process as it unnecessarily causes delay. While having authorisation gates is a good management practice but too much of this could lead to bureaucracy and inflexibility which does not bode well for effective time and cost control. This is supported in literature for example, [2] argued that there is evidence that the application classical planning and control concepts exerted on projects excessively due to management’s drive to reduce operational uncertainty may lead into a vicious circle of bureaucracy and inflexibility for projects.

### ***Use of Adversarial and Non-Collaborative Forms of Contracts***

Similar to the above is the use of adversarial types of contracts that can often be a bottleneck during the project

control process, as they do not aid openness and collaborative working and may sometimes prevent project partners from owning up to mistakes that have been made. This reflects the empirical research by [24], which revealed that ‘strictly adversarial’ and even ‘guarded adversarial’ contract approaches exhibited inferior project cost, time and technical performance than those projects that employed a partnering approach.

### ***Communication Problems within Client Set-up***

The study also revealed that ineffective communication mostly within the client’s organisation often brings about conflicting information. Lack of clear and correct communication between clients’ office staff and their site representatives can sometimes lead to confusion. It was found that some representatives communicate what they want but not what is in the contract which sometimes cause arguments, delay and increased cost that the client later disputes. According to [31] high information asymmetry typically exists between client and contractor which needs to be addressed for project success. The importance of effective communication for effective project control cannot be overstated because project control relies on information and data. For effective project control to be achieved in practice it is important that lines of communication are clear and the most up-to-date information is communicated on time and to the relevant persons during the project control process.

### ***Obstructive Client Representatives***

It was also found that some client representatives can be obstructive in a bid to justify their importance and this does not create a team effort and a sleek project control process. On this, one of the senior executives interviewed said:

“...management problem with the client... is the other problem; we’ve got the client representative... who want to make sure that their position is safe so they create a situation (by being overzealous) to make sure that they’ve got a job.”

This kind of attitude from client representatives does not foretell success for project control efforts and the project. To avoid this, it is imperative that all the project parties adopt a non-adversarial and collaborative approach for effective project control.

## **Challenges Stemming from the Project Team**

### ***Lack of Detailed/Complete Design***

It was revealed that practitioners believe there has been a general decline in the production of detailed design, especially with the increased usage of the design and build procurement route. This is concisely expressed in the statement below by one of the interviewees.

“The real issues as far as I can see is the level of detail which the designers have now got used to not producing...; the drawings that are coming up for construction purposes and don’t have the level of detail in them that they actually need”

The issue of poor quality design has been documented in literature see [15, 7]. The decline in the production of detailed design would lead to more uncertainty in the degree of resources needed to implement a project, making

effective project control more difficult. Although it is not always possible to produce detailed design for all construction projects, designing the project to a much detail as possible at the outset is bound to reduce resources and cost uncertainties associated with incomplete designs; hence, giving the project time and cost control effort a better chance of being effective.

#### ***Lack of Trust Among the Project Partners***

It was also revealed that lack of trust often exists among the project team members. For example, it emerged from the study that sometimes a project partner may try to hide a mistake from the rest of the project team in the hope that it can be rectified without the rest of the team knowing about it. This lack of transparency often leads to the time and cost implication of such errors not being analysed on time. Practices of this nature are bound to be problematic in the quest to achieve effective cost and time control, since information about the project cost and time performance is essential for the project control process. The importance of teamwork among all project participants have been emphasised in the literature by [17].

#### ***Limited Time Devoted to Project Control on Site***

Another revelation from the interviews is that quite often the site team members do not devote enough time to project control, as they are usually busy frantically expending time and effort delivering the project. One reason for this is the impression on site that it will be very onerous to fully participate in the project control process. Reports are therefore half-heartedly produced and rushed, usually not up-to-date and mostly inaccurate. The difficulty faced by the site management team is expressed by an interviewee as below:

“I will say the bottleneck is time itself. We are out there building things and usually there is a frantic effort to get things built...and the project management team is trying to focus on the issue at hand,... and they might have been working nights, they really have little time to report anything else ...; and the result of that is that the data that you get back from the team... isn't very good.”

The above sentiment that project control is an add-on to the duties involved in delivering a project, can only be addressed by instilling a project control culture in an organisation to the extent that the project management team both on site and in the office, realise that project control is a good project management practice to be embraced by all.

#### ***Non-factual Reporting***

Finally, the study revealed that the problem of poor reporting is a major and frequent challenge that needs to be dealt with for project control effort to be effective in practice. From the interviews conducted it was clearly evident that reporting of information by the site management team is not always factual. One of the reasons for this is that site management personnel are sometimes unwittingly optimistic about the status of the project or at worst dishonest to look good. In the hope that they can bring a failing project back on track without raising the alarm to their senior staff based in the office. Consequently, the reported information, which is used during analysing in

project control, ultimately produces results that will not give a true reflection of the project and areas needing corrective action will not be obvious to senior managers making time and cost control ineffective. To give project control a better chance of success it is important that reports are factual, true and accurate (see [38] for more). This will ensure the information in the reports highlight the true project cost and time status and actions can be taken to bring the project back on track.

## CONCLUSIONS

The challenges to achieving effective cost and time control of construction projects in practice as well as recommendations to address these have been described. Design change is identified as the leading factor inhibiting not just time control but also cost control. It was argued that the factors inhibiting time control were also likely to inhibit cost control as spearman rank order correlation showed a strong positive correlation. 16 key challenges were identified with many submissions put forward to address them. It was recommended that management buy-in and support is important for effective project control and that management should instil a project control culture in an organisation to the extent that both site- and office-based realise that project control is should be embraced by all. Cost and time control should also always be integrated, since controlling one without the other is unlikely to be effective. Factual and accurate reporting was also seen as important in avoiding some of these Challenges. Adequate planning was key to ensuring better preparation on how complex interfaces will be controlled. All required project control systems and processes should always be in place before rushing to commence a project. Authorisation gates should not lead to unnecessary bottlenecks in the project control process. Finally, the importance of good communication for effective project cost and time control was stressed since it is essential that lines of communication are clear and the most up-to-date and accurate information is communicated on time and to the relevant persons during the project control process.

This study has resisted the pull of just utilising a questionnaire survey as customary in this area by using both questionnaires and semi-structured interviews. This enabled the teasing out of the day-to-day practical issues encountered by practitioners which make project control difficult and highlighting recommendations that will help them achieve a more effective time and cost control of their projects. The key implication of these findings in practice is that being aware of these challenges will stand practitioners and organisations in good stead as they will be able to guard against them, helping the quest to prevent project cost and time performance failures.

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