Aggregation of Factors Causing Cost Overruns and Time Delays in Large Public Construction Projects: Trends and Implications

Abstract

Purpose
This paper explores the impact that cost overruns and time delays exert on large public construction projects. The purpose of which is to clarify how past and current research regard factors causing cost overruns and time delays in large public construction projects.

Design/methodology/approach
Based on an analysis of a literature selection consisting of 40 journal articles, this paper investigates and ranks the occurrence of and the explanations for cost overruns and time delays in large public construction projects. The study makes use of a kiviat diagram/radar chart in order to visualize multivariate data.

Findings
Aggregated rankings of important causes of cost overruns and time delays are reported. These show a strong emphasis on the management aspect as a primary cause of cost overruns and delays. Additionally, there seems to be a trend toward deemphasizing the role of financial considerations in explaining cost overruns and delays. It is argued that there needs to be a more rigorous assessment of the impact that each factor has on cost increases and delays based on factual observed data as opposed to retrospective accounts from questionnaire respondents.

Research limitations/implications
Only public construction projects have been considered. The results will not be directly applicable to privately funded construction projects and/or projects of a smaller size.

Originality/value
The use of trend data, as illustrated in a kiviat diagram, showing how different ranking factors causing cost overruns and delays have changed in importance over time.

Keywords
Construction management, construction operations, costs, cost estimates, project management, public sector organizations

Article type
Research paper
Introduction

The construction industry has been plagued by cost overruns (Akinci & Fischer, 1998). Unrelenting in its severity, the mere mention of a construction project by media outlets, especially infrastructure projects of considerable size, has become more or less tantamount to costs exceeding budget and completion times reaching further than what was set out initially (Morris, 1990; Raftery, 2003; Siemiatycki, 2009). The public’s perception can hardly be deemed unwarranted as made evident by the staggering number of projects that go beyond budgetary limits. According to Baloi and Price (2003), a sizable majority (63%) of 1,778 construction projects funded by the World Bank exceeded their budgets. The case is further aggravated when it comes to large infrastructure projects such as rail and road construction. Skamris and Flyvbjerg (1997) report that a large share of such projects exceed their initial budgets with cost increases of 50–100% being commonplace and increases beyond 100% not uncommon. In stating these figures, the authors not only shed light on the severity of the problem, but also on its global implications. The data upon which the study was based had been gathered from a range of different geographical locations, spanning five continents, 20 countries, both developed and developing nations, from the late 1920’s to the late 1990’s. This shows that the challenge of cost overruns is clearly a global phenomenon and although there are minor differences depending on the geographical location, the problems persist in nearly every continent. The situation is even more dire in the developing world where corruption carries a significant impact on actual costs and accounts for 10-30% of the value of a single construction contract (World Bank, 2012). This development calls for a thorough examination of how these problems arise. In doing so, it becomes of paramount importance to not only identify the factors that cause cost overruns and delays but also to understand how the impact of these factors have changed over time.

Research Methodology

This paper explores the impact that cost overruns and time delays exert on large public construction projects. In particular, the focus is on mapping the causes underlying cost overruns and time delays in large public construction projects. This is done by segmenting the causes into different categories (Table 2) which is then followed by an analysis of potential trends. The trend data is visualized using a kiviat diagram (Figure 2) which illustrates how the significance of the identified causes for cost overruns and delays have shifted in the period 1985-2014. The study encompasses large public construction projects in general including both singular mega projects as well as a portfolio of standardized projects that collectively make up a large scale project (e.g. housing development). However, the lion’s share of projects covered in this study relate primarily to infrastructure as these are the most prevalent type of large scale public projects discussed in the research literature.

The adopted methods for scoping the available literature draws on the methodical framework developed by Arksey and O’Malley (2005) which consists of five steps:

- Stage 1: identifying the research question
- Stage 2: identifying relevant studies
- Stage 3: study selection
- Stage 4: charting the data
- Stage 5: collating, summarizing and reporting the results
The objective consisted of exploring how past and current research regard the causes of cost overruns and time delays in major public construction projects. In order to investigate the aforementioned research objective, a literature study was carried out. The covered literature consisted predominately of empirical studies discussing cost overruns and time delays in public construction projects. The literature selection included both qualitative and quantitative studies, with an emphasis on the latter, covering the causes of cost overruns and delays in public construction projects. The resulting data was then charted in a kiviat diagram (Figure 2) where it was subsequently analyzed.

The literature search

The literature selection was based on a string of keywords identifying topics related to: i) cost overruns and time delays ii) the construction industry iii) factors or causes iv) public projects and v) mega projects. The precise keyword phrases used along with the accompanying databases are listed in Table 1. Databases were chosen with respect to their listing of relevant papers in addition to including at least one database that had indexed the most well-known peer reviewed journals in the field of Construction Management. This assessment was based on a study by Bröchner and Björk (2008) that evaluated academic journals in that field.

Table 1: The keywords and databases used in the literature search.

<table>
<thead>
<tr>
<th>Database</th>
<th>Keyword string</th>
<th># Results</th>
<th># Journal articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scopus</td>
<td>TITLE-ABS-KEY (&quot;cost overruns&quot; OR &quot;cost increases&quot; OR &quot;cost escalations&quot; OR &quot;budget overruns&quot; OR &quot;delays&quot;) AND TITLE-ABS-KEY (construction OR infrastructure) AND (&quot;factor&quot; OR &quot;determinant&quot; OR &quot;cause&quot; OR &quot;explanation&quot; OR &quot;predictor&quot;) AND TITLE-ABS-KEY (projects)</td>
<td>1,103</td>
<td>587</td>
</tr>
<tr>
<td>Science Direct</td>
<td>TITLE-ABSTR-KEY(&quot;cost overruns&quot; OR &quot;cost in-creases&quot; OR &quot;cost escalations&quot; OR &quot;budget overruns&quot; OR &quot;delays&quot;) AND (&quot;construction&quot; OR &quot;infrastructure&quot;) AND (&quot;factor&quot; OR &quot;determinant&quot; OR &quot;cause&quot; OR &quot;explanation&quot; OR &quot;predictor&quot;) AND (&quot;projects&quot;)</td>
<td>2,148</td>
<td>1,757 (998)¹</td>
</tr>
<tr>
<td>Web of Science</td>
<td>TS=(&quot;cost overrun*&quot; OR &quot;cost increase*&quot; OR &quot;cost escalation*&quot; OR &quot;budget overrun*&quot; OR delay*) AND TS = (construction OR infrastructure) AND TS = (factor* OR determinant* OR cause* OR explanation*) AND TS = (projects)</td>
<td>582</td>
<td>418</td>
</tr>
</tbody>
</table>

¹ Science Direct limits the number of results that can be retrieved.
Selection criteria

The literature search generated a total number of 3,833 results of which only peer-reviewed journal articles were selected, excluding 1,830 results and leaving 2,003 papers. Following this, a cross-checking of the papers were performed in order to remove all duplicate papers that were bound to be included as a result of having used multiple databases. Removing all duplicate results left 1,748 papers remaining. The final step consisted of qualitatively assessing the relevance of each remaining paper. This assessment was bipartite. The first part consisted of reading through titles and abstracts in order to determine whether the papers in question were relevant to the topic being studied. Papers exhibiting any of the following characteristics were removed:

1. Papers not discussing factors that cause cost overruns or delays in the construction industry.
2. Irrelevant use of keywords. If a paper included the search terms but used them in a different context than that intended for the purposes of this study.
3. Exclusive studies of small and/or private construction projects. In keeping in line with the research objective, only studies whose sample size or unit of analysis included large-scale public construction projects were considered.

Filtering the selection according to these criteria yielded a total number of 113 papers remaining. The second part of the assessment consisted of reading through each individual paper and excluding those studies that did not rank the listed factors. This was done in order to be able to make comparisons of the factors causing delays and cost overruns. The final selection that remained consisted of 40 papers (see Appendix I for the unabridged list of selected papers). These articles were then codified with respect to their publication year, the journal in which they were published, and the type of cause of cost overruns and time delays that were discussed. The different causes were identified by means of the literature review and have been categorized as shown in Table 2.

Table 2: Categories of factors causing cost overruns and time delays.

<table>
<thead>
<tr>
<th>Root cause</th>
<th>Exemplary instances</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Lack of communication between contractors and clients.</td>
<td>(C)</td>
</tr>
<tr>
<td></td>
<td>Inefficient communication.</td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>Delayed payment to contractors/consultants.</td>
<td>(F)</td>
</tr>
<tr>
<td></td>
<td>Poor financial planning.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Price increases</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>Poor site management</td>
<td>(MG)</td>
</tr>
<tr>
<td></td>
<td>Inadequate managerial skills</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poor monitoring and control</td>
<td></td>
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<tr>
<td></td>
<td>Slow decision making</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Client initiated change orders</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inadequate design specs</td>
<td></td>
</tr>
</tbody>
</table>
Although other researchers may categorize the causes differently, the following categorization represents the most typical categories mentioned in the research literature. This being based on a scoping of the available research papers covering the area. The included articles were primarily empirical studies that used questionnaires to determine the causes of cost overruns and time delays. The academic journals in which these studies were published are listed in Table 3.

Table 3: The number of publications from each journal.

<table>
<thead>
<tr>
<th>Journal</th>
<th># Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandria Engineering Journal</td>
<td>1</td>
</tr>
<tr>
<td>Built Environment Project and Asset Management</td>
<td>1</td>
</tr>
<tr>
<td>Construction Management and Economics</td>
<td>4</td>
</tr>
<tr>
<td>Engineering Journal of Qatar</td>
<td>1</td>
</tr>
<tr>
<td>Engineering, Construction and Architectural Management</td>
<td>2</td>
</tr>
<tr>
<td>Habitat International</td>
<td>1</td>
</tr>
<tr>
<td>IEEE Transactions on Engineering Management</td>
<td>1</td>
</tr>
<tr>
<td>International Journal of Construction Management</td>
<td>1</td>
</tr>
<tr>
<td>International Journal of Project Management</td>
<td>11</td>
</tr>
<tr>
<td>Journal of Civil Engineering and Management</td>
<td>1</td>
</tr>
<tr>
<td>Journal of Construction Engineering and Management</td>
<td>4</td>
</tr>
<tr>
<td>Journal of Financial Management of Property and Construction</td>
<td>1</td>
</tr>
<tr>
<td>Journal of Management in Engineering</td>
<td>2</td>
</tr>
<tr>
<td>Journal of Planning Education and Research</td>
<td>1</td>
</tr>
</tbody>
</table>
The age of the selected papers ranged from having a publication year corresponding to the year 1985 up to the year 2014, as shown in Figure 1.

| Journal of the South African Institution of Civil Engineering          | 1 |
| Korean Journal of Construction Engineering and Management            | 2 |
| KSCE Journal of Civil Engineering                                    | 2 |
| Life Science Journal                                                 | 1 |
| Modern Applied Science                                               | 1 |
| Research Journal of Applied Sciences, Engineering and Technology     | 1 |

The age of the selected papers ranged from having a publication year corresponding to the year 1985 up to the year 2014, as shown in Figure 1.

**Figure 1: Distribution of papers according to publication year.**

**Literature review**

This section gives an account of the primary causes of cost overruns and delays in public construction projects.

**Cost overruns and public construction projects**

Jahren and Ashe (1990) demonstrated the existence of a correlation between project size and cost overruns. In essence, the larger the construction project, the greater the percentage of cost overrun will be. Similar results were obtained by Shrestha et al. (2013) who in a study of 363 public construction projects found that a greater project size resulted in more substantial cost overruns. These projects, often referred to as mega projects, are defined in terms of their expensiveness, grandness and their disruptive impact on society (Altshuler & Luberoff, 2003). Various estimates are used as a criterion for what constitutes a mega project. The U.S Federal Highway Administration (FHWA, 2004) states that projects in excess of $1 billion can be considered mega projects, other common estimates include half a billion U.S dollars (Flyvbjerg, 2004) and 250 million U.S dollars (Altshuler & Luberoff, 2003).

Flyvbjerg makes the case that the definition of a mega project differs depending on the geographical setting, hence what might constitute a mega project in a more rural area might not be considered as such in a metropolis (Flyvbjerg, 2004). Though there appears to be a strong indication that a large project size will yield higher cost overruns, conflicting views have also
been reported. Odeck (2004) investigated cost overruns in exclusively road projects showing that smaller project sizes contributed to more substantial cost overruns than the larger ones. An observation that Odeck attributed to larger road projects having been under better management than their smaller counterparts. Although Odeck does not offer an explanation for the contradictory results, Cantarelli et al. (2010) propose that the conflicting results may be due to the small sample size of large projects listed in that study.

The passing of time seems to have had little effect on curbing cost overruns. Instead, the trend has marched towards the undertaking of larger and more costly projects; “never” remarks Flyvbjerg (2007, p. 9) “have so many expensive, large-scale projects been built over so short a historical period” which consequently entails significantly higher economic risks. On a similar note, Shrestha et al. (2013) could not find any correlation between project completion year and cost overruns, suggesting that the situation was not improving over time. These findings run contrary to those of Randolph et al. (1987) who indeed did establish a correlation between project completion year and cost overruns. The differing results were attributed to whether or not the construction planning systems had been significantly altered during the time period in question. In the study by Shrestha et al. (2013), the construction practices in the studied region had not been changed significantly over the time interval studied. Hence, the cost overrun figures saw no drastic variation. It may also suggest something entirely different. Granted that both the construction technology and the techniques for estimating costs have improved with time, the observation that cost overrun levels still persist may instead suggest that the root of the problem is not found in engineering or accounting but rather in the realm of politics (Altshuler & Luberoff, 2003).

Furthermore, price increases have been identified by both governmental agencies (The Swedish National Audit Office, 2010) as well as by researchers (Morris, 1990; Mosey, 2009) as one of the chief causes of cost overruns. Morris (1990) argues that approximately 20-25% of all cost overruns can be attributed to price increases. The remainder can be traced to different factors of which the most significant are: poor design and implementation, inadequate project funding, bureaucratic indecisiveness and the lack of coordination between enterprises. This view is not necessarily shared by project managers as shown in a study by Brunes and Lind (2014) in which it was reported that the majority of the respondents of a questionnaire with 101 project managers were either unsure (32%) or opposed (48%) to the idea that price increases was a cause of cost overruns. In addition to the factors mentioned above, the time to deliver the project will also affect if cost overruns will occur (Morris, 1990). The same can be said about non-value adding activities. These activities take time and resources but do not add any value to the project. According to Han et al. (2012), these activities are considered main contributors to both cost overruns and delays in design and construction projects.

The many intricacies of construction projects allow for a large number of cost increasing causes to emerge, thereby elevating the risks and uncertainties involved. The trend towards larger projects with increased complexity results in greater cost and schedule variations which in turn produces unsuccessful ventures (Abdelgawad & Fayek, 2010). In order to appropriately discuss the large plethora of causes, it becomes necessary to categorize each cost with respect to a specific domain. This is what Cantarelli et al. (2010) set out to do in a review of some of the most highly cited reports and articles that deal with explanations for cost overruns. The authors conclude that the general consensus of researchers showed that political explanations constituted the primary source for causing cost overruns in large infrastructure projects. Included in this category were cost underestimation and forecast manipulation, both of which were identified as primary causes (Cantarelli, et al., 2010).

Having established the occurrence of incorrect forecasts, Wachs’ (1989) proposes a number of explanations to account for the phenomenon, most notably that planners are either intentionally producing inaccurate forecasts or that the tools to produce these forecasts are
inadequate insofar as their utility to produce accurate estimations are concerned. In regards to the first point, Wachs’ asserts that data is often fudged in order to support a more politically sound narrative. This is accomplished by using traffic flows that are not representative of the proposed area and in some cases, the figures are downright fabrications. The lack of ethics can in certain cases cause planners to produce estimates that support a predetermined goal, disregard weaknesses in estimations and find consultants who are willing to produce such numbers, disavowing those who refuse.

The high risk nature of the construction industry serves to obscure the driving forces behind cost increases (Akinci & Fischer, 1998). Specifically, it becomes difficult to assign responsibility to the actor who primarily caused the surge in costs. It thereby becomes possible for different interpretations to emerge as different groups of stakeholders assign blame to divergent causes.

In general, causes of cost overruns can be attributed to political, economic, technical or psychological factors. Moreover, each category involves a different explanatory narrative and should therefore be dealt with by using a theoretical model suited for that particular narrative. Whereas political explanations can be explained by for instance Machiavellian theory (focuses on power and influence) or agency theory (focuses on motives based on self-interest), technical explanations may be explained through planning and forecasting theory. Likewise, economical explanations necessitate economic theories such as neoclassical economics or rational theory whereas psychological explanations fall under prospect theory (Cantarelli, et al., 2010).

A common response to mitigating the effects of cost overruns is to undertake initiatives that serve to increase the capabilities of the client organization in handling complex projects. This line of thought is most vividly expressed by auditors who have been assigned to investigate the causes and remedies of cost overruns (Siemiatycki, 2009). Unlike researchers who have studied the phenomenon of cost increases in construction from the outside, auditors have had the benefit of having an inside view from within the public client organization lending them greater access to internal data. Consequently, this inside view has shaped their understanding of both the causes for cost overruns as well as possible remedies to alleviate the situation. Researchers, on the other hand, have largely been outside observers and thereby been able to broadly define the mandate of their studies and to take on an interdisciplinary approach. This approach has emanated in researchers focusing on the need for developing technological processes, upholding incentive structures that rewards accurate cost estimations and that discourages optimism bias (Siemiatycki, 2009).

**Curbing time delays in public construction projects**

In similitude to cost overruns, scheduling delays for construction projects are a common occurrence (Adam, et al., 2015; Anastasopoulos, et al., 2012; Bhargava, et al., 2010). In a survey-based study documenting the different viewpoints of contractors, consultants and clients in regards to the source of delays, Kumarasmawy and Chan (1998) found wide disagreements among the 147 respondents in regards to the type of factors that causes delays in construction projects. According to the views of the contractors, the chief causes for delays were due to postponements in design information, lengthy duration for approving drawings and inadequate site management. Conversely, consultants attributed delays to primarily unforeseen ground conditions, inadequate contractor experience and poor site management and supervision. In order to mitigate the risk of delays occurring, a number of contractual schemes can be put in place such as the use of liquidated damages. It is not uncommon for a provision to be included in the contract stating that punitive damages must be paid by the contractor to the client in the event of a time delay for which the contractor is responsible. In general, such delays do not necessarily result in liquidated damages (Bordat, et al., 2004). Likewise, not all delays can be attributed to the contractor. Scheduling delays are typically divided into: a) excusable delays;
b) compensable delays; and c) non-excusable delays. The first category refers to delays in which neither the client nor the contractor can be assigned blame, typically a force majeure clause is included in the contract to addresses this. Compensable delays are those where the contractor is owed a compensation for delays caused by an unwarranted course of action taken by the client. This might consist of changes in the scope of the project or site conditions that differ from what the client originally stated. Non-excusable delays refer to delays caused by the actions or lack of action by the contractor and where the client may be subject to compensation from the contractor (Kraiem & Diekmann, 1987).

A considerable amount of research has been conducted investigating the causes of non-excusable delays, the focus being on the contractor’s role and not the client’s (Majid & McCaffer, 1998). The classification of delays into the aforementioned groups, though useful, does not necessarily offer a complete account of time related complications. Instead, as Arditi and Pattanaikitchamroon (2006) point out, there are several different situations in which it becomes difficult to assign the cause of a delay to a specific party. This in turn renders it difficult to impose legal recourse in terms of which party should compensate the other. This is particularly palpable in the case of concurrent delays, a type of project delay whereby two or more delays occur simultaneously, either of which would have caused the entire project to exceed the time limit had it occurred by itself (Rubin, 1983). In order to mitigate the occurrence of delays, managers must first be able to identify the lead causes behind delays as this constitutes an essential step in finding a suitable solution. To achieve this, Majid and McCaffer (1998) analyzed eight studies involving over 900 construction organizations in order to identify 21 factors that contributed to delays in completion times.

Following this, the authors ranked each factor in terms of the impact that it exuded on the project’s duration. Most notably: late deliveries, damaged goods and poor planning were identified as the most influential factors in causing time delays (Majid & McCaffer, 1998). A common manifestation of poor planning is the occurrence of change orders. It offers an indication that events did not pan out as originally intended and tends to lead to both longer completion times as well as increased costs due to the purchase of new materials. Josephson et al. (2002) highlight how rework has become an endemic occurrence in the world of construction, causing both cost overruns and delays. Despite this being the case, it may not be entirely feasible to eliminate change orders and rework altogether for as Bordat and Sinha (2004) point out, few construction projects are exempt from the advent of unforeseen circumstances and projects are therefore rarely completed without changes from the owner. Instead, efforts should be taken to minimize the frequency by which they occur.

Furthermore, the length of the delay is also dependent on the type of project undertaken. Maintenance projects generally experience the most severe delays (Bordat, et al., 2004). This may seem counterintuitive as pointed out by Bhargava et al. (2010), one might mistakenly perceive maintenance projects as less complex and therefore expect them to be less prone to cost overruns and delays. On the contrary, road maintenance projects are frequently associated with unpredictable and unforeseen site conditions that often require the relocation of utilities and the redirection of traffic flow. This in turn tends to result in significant delays.

Whereas maintenance projects were most problematic with respect to delays, Bordat et al. (2004) found that bridge and resurfacing projects were consistently better with respect delays (on average 94 and 101 day respectively, compared to 153 days for maintenance projects). Like cost overruns, the more expensive projects tended to result in more significant delays.

**Results and Discussion**

This section contains an abridged list of the most common causes behind cost overruns and delays in public construction projects, based on prevailing literature on the topic. Though some
Factors are more frequently mentioned than others, this does not necessarily imply that they are more influential in determining the scale of the cost overruns and/or delay. Indeed, the frequency by which a particular cause is mentioned may instead offer an indication of its being easily observable as opposed to having a greater impact.

**Explanation of the rankings**

The kiviat diagram below (Figure 2) relays trend data for the causes of cost overruns and time delays. This is based on a Likert scale consisting of five ranking levels where ‘1’ denotes the most significant cause. The average rank order was determined by calculating the mean value assigned to each of the categories for each given time frame. *For example*, in the period 1985-1990, all of the research papers in the selection from that time period listed financial factors as the primary cause for overruns. In the period 1997-2002, on average the papers ranked financial factors to be the 4th most importance cause for overruns. In cases where the data had been compiled from different stakeholders, the clients’ responses were chosen.

![Figure 2: A kiviat diagram illustrating trend data for the causes of cost overruns and time delays in construction projects based on the sampled literature, ranging from 1985-2014.](image)


*PS* = Psychological, *W* = Weather

The most stressed factor of all of the causes studied is that of management related causes (MG). There appears to be little change with respect to time on the importance of managerial decisions in regards to cost overruns and delays. This is perhaps to be expected considering that most key decisions that impact both cost and time parameters are undertaken in the early planning phases of the project. The clear relationship between managerial decisions and cost overruns and delays offers ample support for the call to improve the capabilities of public clients. This importance is further accentuated by the observation made by Odeh and Battaineh (2002) noting that public clients are often the principal agents causing cost overruns and time delays, more so than their private counterpart. Irrespective of this, a more capable public client is conducive to improved managerial control which in turn would help to mitigate potential cost escalations and delays.
The chart also illustrates a rather peculiar shift in how financial factors are perceived with respect to cost overruns and delays. There seems to be a deemphasizing of this factor as we move through time. Its crucial importance notwithstanding, the more recent studies give it a somewhat more modest role in causing cost overruns and delays. Another point to consider is the low scores assigned to both communication (C) and psychology (PS) related factors. This does not necessarily undermine their importance in causing delays and cost escalations. Indeed, it may be so that issues relating to communication or psychology were the underlying causes behind factors such as improper coordination or poor cost estimation, both of which were categorized differently in the examined papers. This highlights a problematic issue when determining the causes of delays and cost increases; it is not always possible to ascertain where the actual cause occurs in the chain of events that unfolded prior to the occurrence of the delay or the cost increase.

Therefore, the above categorization is merely a simplification, the causes determining cost overruns and time delays often intersect (Bhargava, et al., 2010). For instance, it may be argued that rework is a subset of improper planning and that deception is an indication of bad hiring policies. In understanding the underlying causes, it may therefore be prudent, like Cantarelli et al (2010), to distinguish between causes and explanations. The former consist of the singular factors resulting in an effect (such as cost overruns and/or time delay) whereas the latter attempt to offer a broader and more general description of what may have transpired that led to the subsequent effect. An explanation could therefore consist of several causes. It may be as Majid and McCaffer (1998) suggest that the cause consists of improper planning which in turn can be seen as an indication of either inadequacies in the organizational structure that allows for such decisions to be made and/or the shortcomings of individual personnel assigned to the project. Irrespective of the first cause identified, other causes can be introduced to form a descriptive narrative. Thus, two projects may have the same primary cause determining a cost overrun or time delay but still have differing explanations. Each explanation is unique and path dependent to the project being studied and can therefore not be directly transferable to a different project.

Concluding remarks

There has been an examination of the current research landscape in search for the causes that determine cost overruns and time delays in construction projects. In particular with regards to large scale public projects. The existing tendency is to regard cost overruns and delays as types of risks. It is important to emphasize that both cost overruns and delays are consequences of other risks which occur as a result of internal or external factors. They could essentially be viewed as symptoms of one of the 8 categories of root causes identified in Table 1. It is suggested that that the categorization of the different factors causing delays and cost overruns facilitates the process of identifying risks. Although it is not possible to completely eliminate these factors, it should be possible to mitigate them assuming that they have been properly identified and accounted for. This is however predicated on the assumption that the best interest of the project is always sought whereas this is not necessarily the case. Indeed, the relationship between political reasoning and the project mindset is not entirely harmonious. This is particularly a challenge in large scale public projects where project related decisions clash with decisions rooted in political thinking that are not necessarily based on a cost-benefit analysis of the project. The full ramifications of the relationship between the political and the project related goes beyond the scope of this paper. It is however important to keep in mind that choices that are made regarding public construction projects are not made in a vacuum but within the confounds of a larger political discourse.

Currently, the most prevalent way of analyzing cost overruns and delays rests on enumerating the different factors that cause these problems, often supported by a ranking system. The
usefulness of this is that allows for comparisons to be made. However it may also prematurely lull the recipient to a false sense of certainty. Just because these factors have been identified as common factors causing delays and overruns does not mean that they therefore constitute the biggest threats to delivering the project within budget and time. This is obviously not the case. The ranking of factors only indicate their prevalence, not the perniciousness of their implications. Although a particular factor has been identified as a common factor causing cost overrun and delays, it is not necessarily the factor that has the biggest impact on cost overrun or time delays. It is entirely within reason that factors that are prevalent may or may not have a significant impact on the resulting delays or cost overruns.

Herein a research gap can be identified; what is needed in current research into time delays and cost overruns in construction is an understanding of the magnitude of the different factors causing these phenomenon. Particularly in how they actually impact the delivery of the project based not on the retrospective views by the respondents of surveys, but instead on empirical data gathered at the initial source, i.e. from stringent project documentation of cost overruns and delays at the moment in which they occur. This shift in mentality, from merely regurgitating the views of respondents based on what they assume to have been the most impactful to instead regarding the actual data at the time of its occurrence is a necessary step in determining the precise cause of cost overruns and delays in the construction industry. This being noted, a caveat is in order: gathering data of cost overruns and delays at the source instead of through retrospective interviews may be conducive to gaining a clearer picture of the challenges. It should not however be regarded as a panacea. Regardless of how the data is gathered, there will remain the uncertainties of how to assess the factors causing the cost overruns and delays, their magnitude and perhaps most importantly, how these factors interconnect with each other. A challenge that has yet to be solved.

References


[Accessed 14 08 2014].
Appendix I: Selection of papers included in the analysis of causes of cost overruns and time delays


