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Time and cost overruns in the UAE construction industry: a critical analysis

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ABSTRACT

Time and cost are the two main indicators of success in a construction project as it affects all the project participants with equal positive and negative effects. Yet, poor time and cost performance have been a critical issue prevailing in the global construction market and UAE have not been an exception. This research adopted a concurrent mixed-methods approach, utilizing a questionnaire and an interview with UAE construction professionals, to analyse the major causes of this poor time and cost performance. The top five causes for time overrun were concluded as design variation from client and consultant, unrealistic schedules and completion dates projected by clients, delay in obtaining government permits and approvals, inaccurate time estimation by the consultants and change orders from clients. Whereas, the top five causes of cost overrun were summarized as design variation, poor cost estimation, delay in client's decision-making process, financial constraints of client and inappropriate procurement method.

KEYWORDS

Budget overrun; causes; construction sector; cost overrun; schedule overrun; time overrun; UAE

Introduction

Construction sector have been distinctive and dynamic in nature, constantly dealing with uncertainties and temporary teams from multi-lingual and multi-cultural background (Chan and Chan 2004; Puspasari 2005; Acharya et al. 2006; El-Sayegh 2008). According to Puspasari (2005) and Bertelsen and Sacks (2007), construction sector's low performance is a world-wide phenomenon. Time and cost are the main factor of concern as failure to achieve this can equally affect clients, contractors, stakeholders and other project participants (Assaf and Al-Hejji 2006; Nega 2008; Toor and Ogunlana 2008). The study on 450 private residential projects in Kuwait by Koushki et al. (2005), identified the top three causes of time delay as changes in the agreed scope of work, financial difficulties faced by the owners and the lack of experience of the owner. The causes of 70% delay of Saudi building projects were summarized by Assaf and Al-Hejji (2006) as issue of variations in design, payment delays, poor planning and scheduling, lack of site management by contractor, labour deficiency and financial difficulties of contractors.

Construction sector ropes the progress and growth of a country (Faridi and El-Sayegh 2006; Ahady et al. 2017). A study by Motaleb and Kishk (2010) points out that construction sector constitutes about 14% of the GDP of UAE. The construction sector was identified as the fifth largest sector serving Dubai's economy with about 8.3% share in the total GDP during the first quarter of 2014 (Emirates NBD 2014). However, time and cost overrun are frequently and unceasingly faced in construction projects irrespective of its size, nature and complexity (Faridi and El-Sayegh 2006; Ren et al. 2008). About 50% of the UAE projects were analysed with time and cost overrun because of approval delays, delay in client-decision making and poor initial planning (Faridi and El-Sayegh 2006; Motaleb and Kishk 2010). A study done by The Chartered Institute of Building (CIOB) identified Dubai metro as the third most troublesome project with 5 years delay and 85% increase in cost from the estimated schedule and budget mainly due to substantial number of disputes from design and scope changes (Wilks 2015). The 29 stations across red line and 20 across green line were initially planned to be completed by September 2009 and March 2010 respectively, but due to major disputes, only 10 stations in the red line were completed by September 2009 (Harnan 2009) and the entire project was eventually completed by March 2014 delaying the project by 5 years (Libo-on 2014). Whereas, due to problems in monetary resources, contractual differences, approvals and licensing, Maceda (2016) points out that 70% of projects in Dubai are subjected to time overrun.

Understanding the causes of time and cost overrun that can affect the project at distinct phases is

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important to recognize the mitigation measures to diminish the effect on the project performance. The performance of construction industry has always remained a matter of concern and UAE have not been an exception to this case. Hence, the objective of this study is to analyse the major causes of time and cost overrun in the UAE construction industry.

Literature review

Causes of time and cost overrun

The factors analysed by various researchers across different countries points out that some causes for delays and cost overruns are common in all the areas, but some may vary due to the changing culture and practices followed within the country (Dolage and Rathnamali 2013). The major causes of time and cost overrun can be therefore summarized as below:

1. Design variation and change orders: The scope of works is generally not finalized during the planning stage and is frequently subjected to variation as per the interests of the parties involved (Saeed 2009). Change in scope and design is likely to occur due to the uniqueness, tight schedule and budget allocated during the planning stage (Hanna and Ruwanpura 2007). Sunjka and Jacob (2013) identifies design variation and change orders to even cause temporary halt of the project that can further add on to delay of the project. Memon et al. (2011) points out that project cost is mainly affected by poor and delayed design. More often, these claims can lead to disputes and affect the clients' cost and contractors' profits (Baloi and Price 2003).
2. Payment delays and financial constraints: Delay in payment for completed works is sometimes considered as an outcome of bureaucracy that exist in the organization (Frimponga et al. 2003; Sunjka and Jacob 2013). Payment delays to contractors will affect the progress of the project due to postponement in material and equipment conveyance on-site and delay in paying worker's salary (Frimponga et al. 2003; Enshassi et al. 2009; Sunjka and Jacob 2013). The financial capabilities of both contractors and clients are very essential for the uninterrupted project flow (Le-Hoai et al. 2008).
3. Lack of experience: Frimponga et al. (2003) identifies that low bidders are encouraged for public construction projects which may lead to deficiency of experience and skills for management and even availability of appropriate resources that further leads to failure in abiding to the schedule. The experience of client is also essential for proper selection of qualified and experienced contractors to avoid frequent reworks and variations that leads to project delays (Saeed 2009; Sunjka and Jacob 2013). The poor technical performance of the contractor is often linked to the deficiency of proper forecasting and management experience of the contractor which leads to errors and reworks throughout the construction phase of the project escalating project cost (Frimponga et al. 2003; Shanmugapriya and Subramanian 2013; Sunjka and Jacob 2013).
4. Delay in client's decision-making process and involvement: Sunjka and Jacob (2013) points out that delay in decision-making by clients can delay site works and progress. Further, the decision-making process can also be affected by the internal politics, improper communication channels and bureaucracy of an organization (Sunjka and Jacob 2013). The client has the obligation to ensure that the project purposes and requirements are clearly conveyed and understood by all the project participants (Saeed 2009).
5. Poor planning, scheduling and management: It is vital to plot the work before the implementation of the project for successful completion (Saeed 2009). The contractors often fail to provide practical construction programmes and work plans at the initial stage and due to which monitoring project progress becomes a time-consuming task (Sambasivan and Soon 2007; Sunjka and Jacob 2013). Sunjka and Jacob (2013) identifies that unrealistic contractual duration projected by clients affect the time performance due to inadequate time provided to the project managers to plan and forecast. Further, Sambasivan and Soon (2007) identifies that contractor's incompetent site management delays the mitigation of on-site issues.
6. Delay in providing instructions and response: Lack of proper communication and coordination leads to misunderstanding and conflicts that require more time for resolving the disputes (Sunjka and Jacob 2013). The delay in flow of information and instructions affect the timely problem resolution process which further delays the project works (Le-Hoai et al. 2008). Sunjka and Jacob (2013) points out that proper coordination and communication is essential between

the main contractors and sub-contractors for timely delivery of assigned works.

7. Delay in design, approval and inspection: Construction projects are sometimes predicted with the conceptual design and details which further affects the practicality and structural feasibility that leads to variation throughout the construction phase of the project (Saeed 2009). Sunjka and Jacob (2013) points out that improper designs from consultant further delays execution due to the time taken for reviewing, changing and approvals of these designs. Delay in release of completed design and contractual documents prior to execution shall affect the project commencement leading to accumulated delay (Sunjka and Jacob 2013). Frequent and prolonged inspections are often considered as distraction to the contractors and can affect the progress and consecutive tasks (Sunjka and Jacob 2013).
8. Poor labour productivity and resource deficiency: Sunjka and Jacob (2013) points out that poor productivity of labour on-site results in errors and rework leading to delays and cost overrun. Poor productivity occurs due to the inadequate communication, defensive labour policies and inefficient organizational management and is mainly affected by the appreciation level and recognition than salary factors (Saeed 2009). Frimponga et al. (2003) identifies that the material procurement can range from weeks to months affecting the construction schedule. According to Le-Hoai et al. (2008) and Sunjka and Jacob (2013), the contractors are mainly responsible for the proper material estimation, but clients and consultants also have definite role to ensure that the estimation is clearly carried out. Resource shortage occurs due to poor material estimation, variation in material prices, supplier inefficiency, transportation delays, organizational payment procedures and confirmation delays (Le-Hoai et al. 2008; Musa 2012).
9. Poor time, contract and risk management: The lack of expertise in preparation and management of contract often leads to misuse and misinterpretation of contractual agreements that can further alleviate the disputes leading to project delays or even complete halt (Le-Hoai et al. 2008). Ren et al. (2008) points out that the contractors are not often communicated about the variations and discrepancies on-time affecting the management process. Shanmugapriya and Subramanian (2013) states that change of contract often leads to variations in material specification leading to project cost-overrun. The current tool and techniques for risk management and assessment are rarely used by contractors in practice and often risks are managed based on assumptions, experiences, rules of thumb and instinctive judgements leading to poor risk management (Baloi and Price 2003).
10. Poor initial time and cost estimation: The successful completion of any work is estimated by the variation from the contractually agreed initial time and cost and failure to adhere to this shall cause delays and cost overrun in projects (Memon et al. 2011). However, Memon et al. (2011) points out that time overrun is the major factor that further leads to cost overrun. Enshassi et al. (2009) points out that the contractors often estimate initial tender considering the market price at the time of tender and due to the long tender phase of the project, the market price for materials and equipment can fluctuate during construction that leads to cost overrun during execution of the project.
11. Unfavourable site and weather conditions: Poor weather like rains and other topographic conditions are uncontrollable factors on-site that may lead to delays (Frimponga et al. 2003). Further dry season along with humidity can also affect the productivity of workers which results in less output and coordination between workers that affect the project duration (Frimponga et al. 2003). Le-Hoai et al. (2008) suggests that the risks related to unforeseen site and weather aspects should be equally allocated and stated in the contract between the participants to dodge occurrence of arguments and delays.
12. Inflation, market competition, currency-exchange rate unstable economic-political situations: Inflation of material prices are generally seen when the demand of good outrages the supply affecting the cost of construction resulting in project cost overrun (Frimponga et al. 2003). Le-Hoai et al. (2008) concludes the higher demand of common construction materials like steel, cement etc. have resulted in increase of material cost. The unstable political situations such as strikes, military attacks and border closures affects the availability of materials at the right time which further leads to increase in market price of the materials (Enshassi et al. 2009). In such cases importing materials can

also be difficult due to the high security situations at the borders (Enshassi et al. 2009).

Causes of time and cost overrun in UAE construction projects

Faridi and El-Sayegh (2006) studies the UAE projects to conclude that the major causes of delays and cost overrun revalidate the studies done by researchers in various other countries. Yet, Ren et al. (2008) studies Dubai construction projects and points out that the projects face unique challenges due to the existence of different culture, complex demand of style and quality, lack of workforce and involvement of world-wide teams which makes the cause of delays and cost overrun to be slightly diverse from other countries. The top five major causes of time and cost overrun was identified by Faridi and El-Sayegh (2006) as lack of initial planning, delay in preparation and sanction of drawings, deficiency of site supervision and management, delay in client decision-making and delay in acquiring permits and approvals from government agencies. El-Sayegh (2008) points out that poor management of internal and external risks along with unrealistic construction schedule, lack of proper intervention by clients, frequent design changes, shortage of labour and material, delay in approvals/permits and client's financial constraints are major cause of time and cost overrun of UAE projects.

Research design and methodology

A mixed methods approach or triangulation method is adopted as a means of collecting data in this research. A concurrent mixed approach is utilized in which the quantitative and quantitative data was collected at the same time to statistically analyse the major causes of time and cost overrun in the UAE construction sector. The qualitative data also helps in gaining more insight for the defined research objectives and identifies the important strategies that could improve poor time and cost performance in the UAE.

The quantitative approach using a generalized questionnaire survey statistically analyses the research objectives, whereas the qualitative approach using a semi-structured interview with highly experienced construction professionals in the UAE, concurrently revalidates the outcomes and gain a reasoning for the current situation prevailing in the industry (Zikmund et al. 2013; Creswell 2014).

The quantitative data was collected utilizing a questionnaire which was shared via personal email and professional networking sites to 60 random professional samples within the construction sector from different project entities including clients, design consultants, contractors and other project participants, out of which 53 (88.34%) completed responses were received. The data acquired from the perspective of various project participants provide a better understanding and equalized perception about the research problem.

A personal interview session was then conducted concurrently with eight well-experienced construction professionals from various well known and established organizations through a snowball or chain-referral technique. The interviewees were related to various project participants including two clients, two design consultants, one project management consultant (PMC), one cost management consultant (CMC) and two main contractors. A semi-structured interview was adopted in this research where a covering letter and questions of interest were shared with the personnel prior to the interview keeping the session open to discuss any questions related to the research problem. With a response rate of 100%, the interview provided a descriptive critical analysis for the research objective.

Result analysis and comparison

Questionnaire analysis

The 53 questionnaire responses were received from wide range of construction professionals within the industry which includes project managers, project engineers, architects, planning professionals, commercial managers, quantity surveyors, regional director, safety officers, site engineers, contracts managers and general managers as depicted in Figure 1.

The responses were received from personnel related to various project entities such as client (15%), consultants (21%), PMCs (15%), CMCs (17%), main contractors (23%) and sub-contractors (9%) which help achieve a balance in the perspective about project lags and cost-overrun in the UAE. Out of 53 respondents, 42 respondents (79%) have an experience of above 6 years in the construction industry and 38 respondents (72%) have an experience of above 6 years in the UAE construction industry as depicted in Figure 2.

52 respondents (98%) agreed that time and cost overrun are inevitably existent in the construction industry (Figure 3). This agrees to study stated by Faridi and El-Sayegh (2006) and Ren et al. (2008) that poor performance of construction projects have been

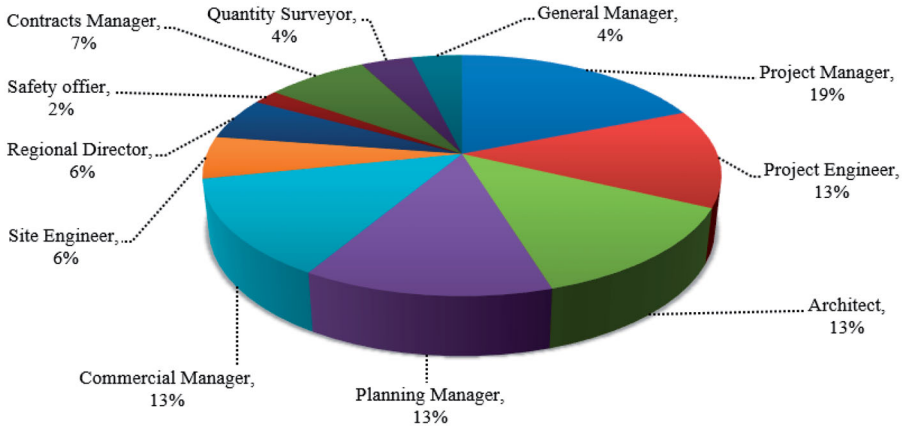

Figure 1. Designation of the respondents.

visible continuously in a wide range of construction projects.

The questionnaire analysis 30 major causes of time overrun derived from the literature review to be ranked using a Likert scale from 1 to 5 based on the impact (where weight '1' depicts very low impact and '5' depicts very high impact), considering the current situation of the UAE construction sector.

The 30 major causes analysed were design variation from client/consultant, poor selection of contractors and suppliers by clients, delayed payment to contractors, change orders from client, lack of client's experience, lack of client involvement and management, financial constraints and inadequate fund allocation from client, delay in client decision-making process, unrealistic schedules and completion dates projected by clients, poor planning and scheduling by consultants, lack of experience of consultants, inaccurate time estimation, lack of consultant's experience, poor supervision and timely instruction from consultants, delay in providing approvals for variations from consultants, incomplete drawings and details provided by consultants, prolonged procedures of inspections by consultants, poor labour productivity, contractor's resource deficiency (labour, material and equipment), poor site management and coordination of contractors, construction errors, delay in material delivery, contractor's financial constraints, lack of skilled subcontractors/labours and technical staffs, excessive work load and pressure on contractors, deficiency of materials, equipment and tools in the market, unfavourable weather and site conditions, delays in transportation of importing of materials, poor risk management by contractors and delay in obtaining government permits and approvals.

The response received was calculated using the weighted score method (Table 1) to analyse the average ranking score using the formula as shown below:

$$\text{Average Ranking Score} = X_1W_1 + X_2W_2 + X_3W_3 \ldots . + X_nW_n/\text{Total} \quad (1)$$

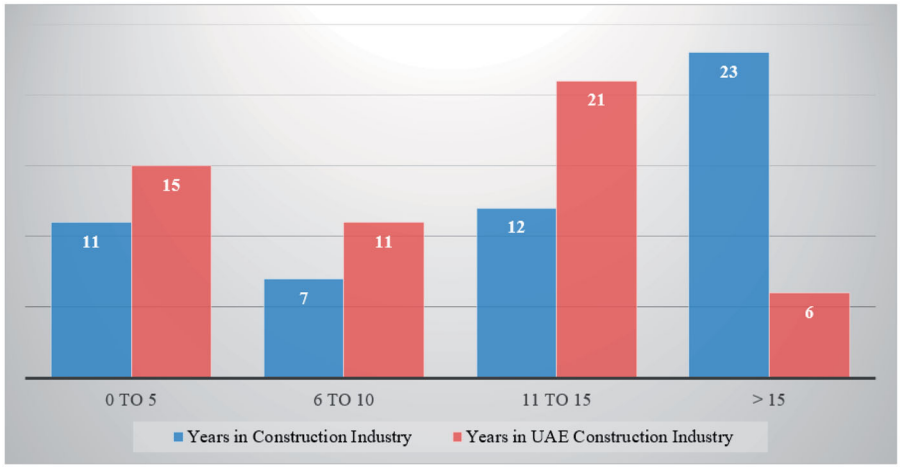

Figure 2. Experience of the respondents.

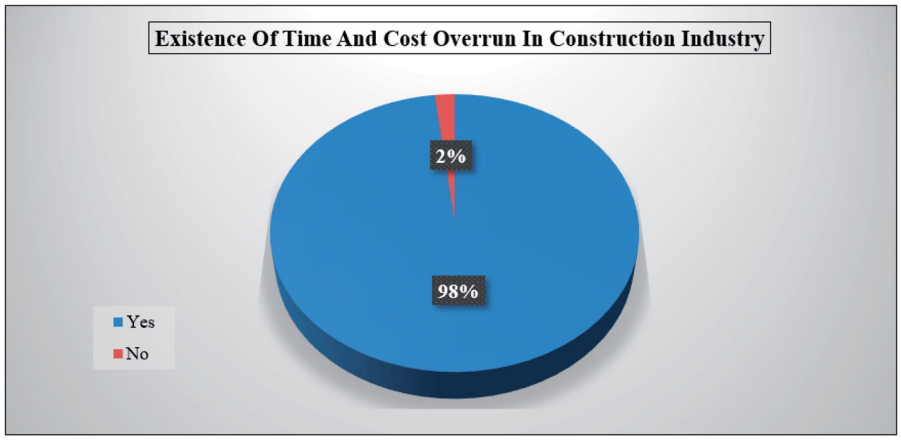

Figure 3. Existence of time and cost overrun in the construction industry.

Table 1. Likert-scale analysis for causes of time overrun using weighted-score method.

S. No	Factor description	Very high impact 5	High impact 4	Mode-rate impact 3	Low impact 2	Very low impact 1	Total	Score
1	Design variation from client/consultant	41	8	2	2	0	53	4.66
2	Poor selection of contractors and suppliers by clients	32	16	4	1	0	53	4.49
3	Delayed payment to contractors	29	15	6	2	1	53	4.3
4	Change orders from client	34	14	4	0	1	53	4.51
5	Lack of client's experience	16	26	9	2	0	53	4.06
6	Lack of client involvement and management	8	24	19	2	0	53	3.72
7	Financial constraints and inadequate fund allo-cation from client	13	26	10	4	0	53	3.19
8	Delay in client decision-making process	26	20	5	2	0	53	4.32
9	Unrealistic schedules and completion dates pro-jected by clients	34	16	2	1	0	53	4.57
10	Poor planning and scheduling by consultants	28	18	4	3	0	53	4.34
11	Lack of experience of consultants	16	24	7	4	2	53	3.91
12	Inaccurate time estimation	32	16	5	0	0	53	4.51
13	Lack of consultant's experience	13	21	10	8	1	53	3.7
14	Poor supervision and timely instruction from consultants	18	17	9	9	0	53	3.83
15	Delay in providing approvals for variations from consultants	31	16	6	0	0	53	4.47
16	Incomplete drawings and details provided by consultants	34	12	5	2	0	53	4.47
17	Prolonged procedures of inspections by consultants	29	12	8	3	1	53	4.23
18	Poor labour productivity	11	24	8	8	2	53	3.64
19	Contractor's resource deficiency (labour, mater-ial and equipment)	12	20	13	6	2	53	3.64
20	Poor site management and coordination of contractors	13	28	6	4	2	53	3.87
21	Construction errors	5	14	14	8	2	53	3.04
22	Delay in material delivery	5	19	13	14	2	53	3.21
23	Contractor's financial constraints	4	27	11	11	0	53	3.45
24	Lack of skilled sub-contractors/labours and tech-nical staffs	8	25	11	8	1	53	3.58
25	Excessive work load and pressure on contractors	13	23	7	7	3	53	3.68
26	Deficiency of materials, equipment and tools in the market	8	18	9	16	2	53	3.26
27	Unfavourable weather and site conditions	9	20	10	8	6	53	3.34
28	Delays in transportation of importing of materials	3	15	10	18	7	53	2.79
29	Poor risk management by contractors	19	18	6	7	3	53	3.81
30	Delay in obtaining government permits and approvals	34	15	3	1	0	53	4.55

where '*X*' is the count of respondents for the answer choice and '*W*' is the weightage of the position ranked.

Hence, the 10 most crucial factors leading to time overrun in the UAE construction sector was estimated and analysed as shown in Table 2.

Table 2. Top 10 ranked causes of time overrun in UAE.

Rank	Causes	Score
Rank 1	Design variation from client and consultant	4.66
Rank 2	Unrealistic schedules and completion dates projected by clients	4.57
Rank 3	Delay in obtaining government permits and approvals	4.55
Rank 4	Inaccurate time estimation by the consultants Change orders from clients	4.51
Rank 5	Poor selection of contractors and suppliers by the client/poor procurement strategy	4.49
Rank 6	Delay in getting approval from consultant for variations Incomplete drawings and details provided by consultant	4.47
Rank 7	Poor planning and scheduling by consultants	4.34
Rank 8	Delay in client decision making process	4.32
Rank 9	Delayed payment to contractors	4.30
Rank 10	Prolonged procedures of inspections by consultants	4.23

Further, the questionnaire analysis 20 major causes of cost overrun derived from the literature review using a Likert scale from 1 to 5 based on the impact (where weight '1' depicts very low impact and '5' depicts very high impact), considering the current situation of the UAE construction sector.

The 20 major causes analysed were design variation from client/consultant, lack of client's experience, financial constraints of client, delay in client's decision-making process, contractor's resource deficiency (material, labour and equipment), inefficient contractor performance, inappropriate procurement method, lack of flexibility in design, poor initial planning, poor labour productivity, poor cost estimation of the project, lack of risk management during the execution phase, lack of understanding the contract conditions by the project participants, size and complexity of the project, poor weather conditions, inflation and fluctuation of material and machine prices, changing currency exchange rate, political situations, level of market competition and economic instability of the country (Table 3).

The response received was scored using the average ranking score formula and the 10 most crucial factors leading to cost overrun in the UAE construction sector was analysed as shown in Table 4.

Table 3. Likert-scale analysis for causes of cost overrun using weighted-score method.

S. no	Factor description	Very high impact 5	High impact 4	Mode-rate impact 3	Low impact 2	Very low impact 1	Total	Score
1	Design variation from client/consultant	43	5	5	0	0	53	4.72
2	Lack of client's experience	25	12	13	1	2	53	4.08
3	Financial constraints of client	30	16	6	1	0	53	4.42
4	Delay in client's decision-making process	32	13	7	1	0	53	4.43
5	Contractor's resource deficiency (material, labour and equipment)	14	24	6	9	0	53	3.81
6	Inefficient contractor performance	13	28	7	4	1	53	3.91
7	Inappropriate procurement method	23	23	6	1	0	53	4.28
8	Lack of flexibility in design	17	23	7	5	1	53	3.94
9	Poor initial planning	23	20	5	3	2	53	4.11
10	Poor labour productivity	11	26	12	1	3	53	3.77
11	Poor cost estimation of the project	35	15	2	1	0	53	4.58
12	Lack of risk management during the execution phase	22	22	8	1	0	53	4.23
13	Lack of understanding the contract conditions by the project participants	17	20	11	4	1	53	3.91
14	Size and complexity of the project	11	16	10	14	2	53	3.38
15	Poor weather conditions	4	8	15	21	5	53	2.72
16	Inflation and fluctuation of material and machine prices	2	5	13	25	8	53	2.4
17	Changing currency exchange rate	1	4	9	19	20	53	2
18	Political situations	3	6	7	13	24	53	2.08
19	Level of market competition	3	12	10	10	18	53	2.47
20	Economic instability of the country	4	7	7	13	22	53	2.21

Table 4. Top 10 ranked causes of cost overrun in the UAE.

Rank	Causes	Score
Rank 1	Design variation from client and consultant	4.72
Rank 2	Poor cost estimation of the project	4.58
Rank 3	Delay in client's decision-making process	4.43
Rank 4	Financial constraints of client	4.42
Rank 5	Inappropriate procurement method	4.28
Rank 6	Lack of risk management during the execution phase of the project	4.23
Rank 7	Poor initial planning	4.11
Rank 8	Lack of client's experience	4.08
Rank 9	Lack of flexibility in design	3.94
Rank 10	Inefficient contractor performance Lack of understanding the contract conditions by the project participants.	3.91

Interview analysis

The interview was targeted to highly experienced professionals in the construction sector with 50% of the interviewees having 11–15 years of experience in the UAE construction sector and 50% were over 15 years of experience in the UAE. The interviewees have been experiencing time and cost overrun throughout their professional experience (Figure 4).

The interviewees belong to prominent organizations related to client, design consultants, PMCs, CMCs and contractors dealing with building and infrastructure projects in the UAE as depicted in Figure 5. This enables the researcher to gain an insight about the perspective of various project participants dealing with different projects in UAE.

Interviewee 1 and 5 raised the main causes of time overrun in UAE construction industry as the scope changes and design variation from client, delay in inspection by consultants, statutory approval delays, lack of contractor resources and low productivity. The main reason for the occurrence of these issues were contemplated by the interviewees that the time line required for approvals and on-site variations are generally not estimated in the initial stages of the project. Interviewee 2 in consent with interviewees 1 and 5 adds to the causes that late nomination of contractors and sub-contractors and payment delays by client further can delay the project due to inefficient contractor performances. Interviewee 3 adds on-site conditions along with the earlier causes mentioned due to the high chances of variation that leads to delay and cost overrun during construction phase. Interviewee 4 and 6 agreeing with other interviewees added to the causes that inaccurate time estimation, inefficient procurement strategy, poor supervision of contractors, poor project management and incomplete design especially MEP designs can further delay the project. These causes were related to the inexperience of the clients and poor consultation advices provided by the consultancies. Interviewee 7 points out that delay in client

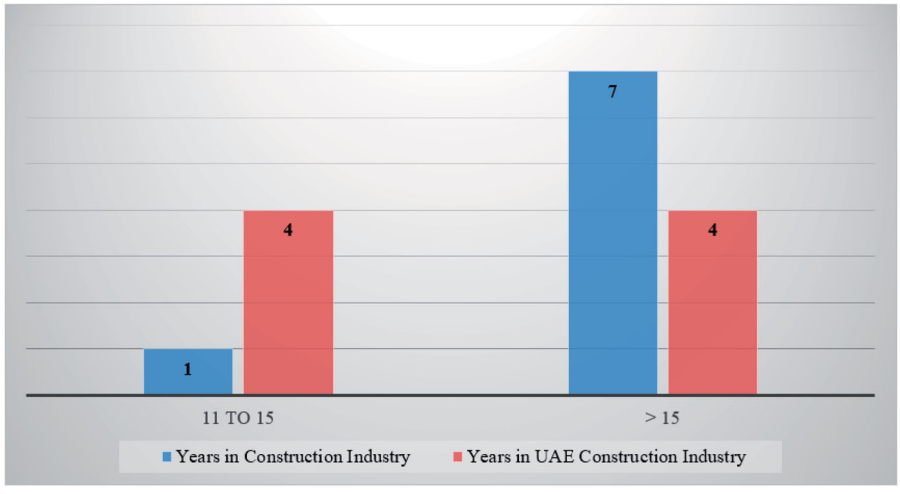

Figure 4. Experience of the interviewees.

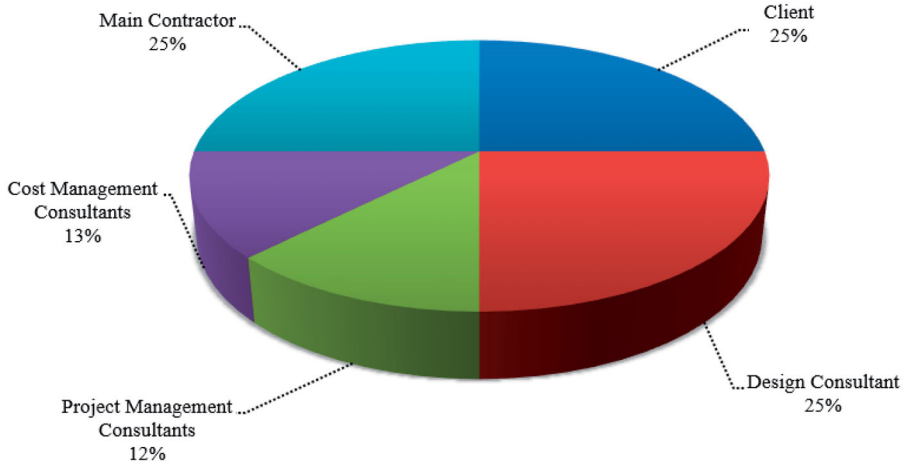

Figure 5. Interviewee's organization.

decision-making is a major cause that delays a project due to the high intervention of clients at all stages of a project. Interviewee 8 in consent with others mentions that errors in design also affects time overrun of a project.

The above analysis of the response summarises the major causes of time overrun as design variation and scope changes from client and consultant, unrealistic schedules and completion dates projected by clients, inaccurate time estimation by the consultants, delay in obtaining government permits and approvals, delay in getting approval from client and consultant for variations, late nomination of contractors and inefficient contractor with lack of resources, poor selection of contractors and suppliers by the client/poor procurement strategy, delay in client decision-making process, incomplete drawings and details provided by consultant, poor planning, scheduling and management by consultants, prolonged procedures of inspections by consultants and delayed payment to contractors.

The above study revalidates the causes of time overrun analysed in questionnaire analysis as wells as in the literature study done on Faridi and El-Sayegh (2006), El-Sayegh (2008), Ren et al. (2008) and Motaleb and Kishk (2010).

All the interviewees are in consent with each other that the factors causing time overrun leads to cost overrun in a construction project revalidating the statement by El-Sayegh (2008). The interviewees further concluded that this occurs mainly due the fact that 'Time is money' where each day of delay leads to a cost factor associated with it. Further, interviewee 2 adds that variations, incomplete and errors in design that occurs due to designing without prior consideration of government requirements, inappropriate and lack of understanding of form and type of contract, inappropriate procurement strategy, inaccurate cost analysis and estimation and client financial difficulties as major factors causing cost overrun. Interviewee 3 and 6 add that improper planning and management of resources leads to cost overrun in a project due to the delay and variation factor associated with it. Interviewee 4 in consent with others adds that lack of adding contingency pricing and improper pricing of the contractor and improper risk management by the contractor also causes budget overrun in a project. Interview 8 further adds delay and improper client decision-making also affects the budget of the project.

The above analysis summarises the main causes of cost overrun as variations and scope changes, delay in client decision-making process, poor cost estimation and analysis, incomplete and erroneous design, lack of understanding the contract form and type, inappropriate procurement strategy, client's financial difficulties, improper risk management, resource deficiency and poor contractor performance and improper pricing of the contractor.

The above study revalidates the causes of cost overrun reviewed in literature by El-Sayegh (2008), Ren, et al. (2008) and Motaleb and Kishk (2010) and the questionnaire analysis.

Conclusion

The aim of this dissertation is to investigate, evaluate and analyse the causes of construction delays and cost overruns in the UAE construction sector. The performance of the industry is mainly determined by its timely completion within the estimated budget and without compromising on quality. In UAE construction sector, poor time and cost performance have been an alarming and occurring issue. However, majority of the projects go unreported.

Design variation from client and consultant, unrealistic schedules and completion dates projected by clients, delay in obtaining government permits and approvals, inaccurate time estimation by the consultants and change orders from clients, were concluded as the top five causes of time overrun in the UAE construction industry. Whereas, the top five causes of cost overrun were summarized as design variation, poor cost estimation, delay in client's decision-making process, financial constraints of client and inappropriate procurement method. These causes are experimentally proven applicable to various countries. However, due to involvement of various cultures and local authorities, delays and cost overrun in UAE have been significantly related to the approvals associated with the government entities unlike other countries. Client's involvement and coordination with other project entities and vice-versa is also a major concern for delays and cost overrun in the UAE construction industry. The relation between client, consultants and contractors must be strengthened with benefits and rewards by incorporating incentivization or process of reward conditions as well as adopting welcoming contract form like NEC.

Research on how various contract forms can help improve the performance of the UAE construction sector and detailed research and analysis on the impact of current tools and techniques to improve the time and budget performance in the UAE construction sector can widely help to improve the performance of the construction industry in future.

Disclosure statement

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References

Acharya NK, Lee YD, Kim JK. 2006. Critical construction conflicting factors identification using analytical hierarchy process. KSCE J Civil Eng. 10(3): 165–174.

Ahady S, Gupta S, Malik R. 2017. A critical review of the reasons of cost overrun in construction industries in developing countries. Int Res J Eng Technol (IRJET). 4(3): 2550–2558.

Assaf SA, Al-Hejji S. 2006. Reasons of delay in large construction projects. Int J Project Manage. 24(4): 349–357.

Baloi D, Price AD. 2003. Modelling global risk factors affecting construction cost performance. Int J Project Manage. 21(4): 261–269.

Bertelsen S, Sacks R. 2007. Towards a new understanding of the construction sector and the nature of its production. 15th Conference of the International Group for Lean Construction. p. 46–56.[8]

Chan AP, Chan AP. 2004. Key performance indicators for measuring construction success. Benchmarking. 11(2): 203–221.

Creswell JW. 2014. Research design: qualitative, quantitative, and mixed methods approaches. 4th ed. Thousand Oaks (CA): SAGE Publications, Inc.

Dolage D, Rathnamali D. 2013. Reasons of time overrun in construction phase of building projects: a case study on Department of Engineering Services of Sabaragamuwa Provincial Council. Engineer: J Inst Engineers Sri Lanka. 63(3): 9–18.

El-Sayegh SM. 2008. Risk assessment and allocation in the UAE construction sector. Int J Project Manage. 26(4): 431–438.

Emirates NBD. 2014. Dubai's construction sector overview. [accessed 2017 May 19]. https://www.emiratesnbd.com/plugins/ResearchDocsManagement/Documents/Research/Emirates%20NBD%20Research%20Dubais%20Construction%20Sector%20Overview%202%20October%202014.pdf.

Enshassi A, Al-Najjar J, Kumaraswamy M. 2009. Delays and cost overruns in the construction projects in the Gaza Strip. J Fin Manage Prop Construct. 14(2): 126–151.

Faridi AS, El-Sayegh SM. 2006. Significant factors causing delay in the UAE construction sector. Construct Manage Econ. 24(11): 1167–1176.

Frimponga Y, Oluwoye J, Crawford L. 2003. Reasons of delay and cost overruns in construction of groundwater projects in a developing country; Ghana as a case study. Int J Project Manage. 21(5): 321–326.

Hanna M, Ruwanpura JY. 2007. Simulation tool for manpower forecast loading and resource leveling. Simulation Conference. 2007 Winter. Washington (DC): IEEE..

Harnan E. 2009. Changes to metro put cost up by Dh12bn, The National UAE. [accessed 2017 Jun 27]. https://www.thenational.ae/uae/transport/changes-to-metro-put-cost-up-by-dh12bn-1.562126.

Koushki PA, Al-Rashid K, Kartam N. 2005. Delays and cost increases in the construction of private residential projects in Kuwait. Construct Manage Econ. 23(3): 285–294.

Le-Hoai L, Lee YD, Lee JY. 2008. Delay and cost overruns in Vietnam large construction projects: a comparison with other selected countries. KSCE J Civil Eng. 12(6): 367–377.

Libo-on LB. 2014. Dubai metro fully functional; Al Jadaf, Creek stations open to public. Khaleej Times. [accessed 2017 Jun 27]. http://www.khaleejtimes.com/article/20140302/ARTICLE/303029884/1013.

Maceda C. 2016. 70% of Dubai projects facing delays-analyst. Gulf News Property. [accessed 2017 Jan 15]. http://gulfnews.com/business/property/70-of-dubai-projects-facing-delays-analyst-1.1669124.

Memon AH, Rahman IA, Azis AAA. 2011. Preliminary study on causative factors leading to construction cost overrun. Int J Sustain Construct Eng Technol. 2(1): 57–71.

Motaleb O, Kishk M. 2010. An investigation into causes and effects of construction delays in UAE. In: Egbu C, editor. Proceedings 26th Annual ARCOM Conference; Sep 6–8; Leeds, UK. Association of Researchers in Construction Management. p. 1149–1157. http://www.arcom.ac.uk/-docs/proceedings/ar2010-1149-1157_Motaleb_and_Kishk.pdf

Musa ID. 2012. The reasons and effect of delay in construction sector project [Unpublished PhD dissertation]. Universiti Malaysia Pahang. http://umpir.ump.edu.my/7866/1/INTAN_DIANA_BINTI_MUSA.PDF

Nega F. 2008. Reasons and consequences of cost overrun on public building construction projects in Ethiopia. Ethiopia: Addis Ababa University.

Puspasari RT. 2005. Factors causing the poor performance of construction project [Unpublished Masters dissertation]. Universiti Technologi Malaysia. http://eprints.utm.my/id/eprint/3723/1/TatianaRinaPuspasariMFKA2005.pdf

Ren Z, Atout M, Jones J. 2008. Root causes of construction project delays in Dubai. In: Dainty A, editor. Proceedings 24th Annual ARCOM Conference; Sep 1–3; Cardiff, UK. Association of Researchers in Construction Management. p. 749–757. http://citeseerx.ist.psu.edu/viewdoc/download?-doi=10.1.1.454.7590&rep=rep1&type=pdf

Saeed SAA. 2009. Delay to projects – cause, effect and measures to reduce/eliminate delay by mitigation/acceleration [Unpublished Project management programme dissertation], p. 1–137. Dubai: The British University in Dubai.

Sambasivan M, Soon YW. 2007. Reasons and consequences of delays in Malaysian. Int J Project Manage. 25(5): 517–526.

Shanmugapriya S, Subramanian DK. 2013. Investigation of significant factors influencing time and cost overruns in Indian construction projects. Int J Emerg Technol Adv Eng. 3(10): 734–740.

Sunjka BP, Jacob U. 2013. Significant causes and effects of project delays in the Niger delta region Nigeria. SAIIE25 Proceedings: Stellenbosch South Africa © 2013 SAIIE. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.882.9428&rep=rep1&type=pdf

Toor S, Ogunlana SO. 2008. Problems causing delays in major construction projects in Thailand. Construct Manage Econ. 26(4): 395–408.

Wilks S. 2015. The century's most troublesome construction projects. Construction Manager Magazine. 7th October.

Zikmund WG, Babin BJ, Carr JC, Griffin M. 2013. Business research methods. 9th ed. Boston (MA): South-Western Cengage Learning.