

T.A. Khaleel

Building and
Construction Eng. Dep.,
University of Technology
Baghdad, Iraq
drtarikhalil@gmail.com

I.Z. Hadi

Construction Management
Re-construction and
Projects Directorate,
Ministry of Higher
Education and Scientific
Research, Baghdad, Iraq
inasszaki@yahoo.com

Received on: 27/09/2016

Accepted on: 23/2/2017

Controlling of Time-Overrun in Construction Projects in Iraq

Abstract- *This paper is about analyzing time overrun in construction projects. The principle targets are centered on researching the causes, effects and strategies for controlling time over-run in development ventures in Iraq. The study has been accomplished based on previous researches in addition to a questionnaire form and case studies. Forty-two factors of time overrun causes under four main responsible parties were distinguished (owner, consultant, contractor, others). Eight major impacts of time overrun were also identified. The questionnaire form was formulated based on the above data and was distributed to the selected respondents which are professionals in construction industry. Depending on the results of the questionnaire form, the major origin of time overrun was found that the contractor is the responsible for most of the time overrun (i.e. Contractor's financial difficulties Shortage of skilled manpower and the other causes related to him). The most important two impacts of time overrun were Increase the cost of the project, Quality degradation and Increasing in overhead expenses, the highest percentage of time-overrun in the nine existed project 319% and the most common causes were (change in economic condition and Company's lack of experience).According to the research findings a management system has been proposed to control on the time overrun in construction projects.*

Keywords: *Time overrun, management, construction projects, controlling.*

How to cite this article: T.A. Khaleel, and I.Z. Hadi "Controlling of Time-Overrun in Construction Projects in Iraq," *Engineering and Technology Journal*, Vol. 35, Part A, No. 2, pp. 111-117, 2017

1. Introduction

Time Overrun is one of the most important issues being facing the construction projects today. Time overruns occur when projects not completed on time required in the project plan specifies. There are many reasons responsible for the time overrun, which require serious attention to understand in order to complete successfully the projects on time, this empirical study on the time overruns of construction project in Iraq is undertaken because of a lack of previous study of the causes of cost time overrun in the Iraq construction industry.

The main objectives of this study are as follows to investigate and identify the root causes behind time overrun on construction projects, to examine the various impacts of time over run occurrences on construction projects, to suggest management system to control the time overrun on construction projects and to ensure that projects are completed in a timely manner. Based on the findings of the previous studies the following hypothesis are proposed for this study.

2. Overview of Time Overrun in construction projects

According to Enshassi [1], the hugest reasons for time delay recognized in this exploration are;

strikes, outskirt terminations, absence of materials in business sectors, deficiency of development materials at site, postponement of material conveyance to site, income issues amid development, and poor site administration.

Mahamid [2], explain that the examination of the study demonstrated that the top dangers influencing time overwhelm in street development ventures in Palestine are: budgetary status of the contractual workers, instalment delays by the proprietor, the political circumstance and division of the West Bank, poor correspondence between development parties, absence of gear proficiency and high rivalry in offers.

The outcomes don't build up causality yet they do demonstrate various prominent connections. Mistaken cost evaluations are in charge of the most grounded relationship with net cost development changes and are connected with 40% of the gathered cost invades. What's more, the begin year has little effect on the compound yearly development rate of cost overwhelms. This recommends generally better execution of more up to date projects may demonstrate illusionary as projects age. Finally, altered value contracts seem to have moderately littler overwhelms, despite the fact that this may let us know more about which projects are liable to get settled value contracts

instead of what impact settled value contracts might have on system execution [3].

Baloyi [4], state that the expansion in material expense is the single biggest donor to cost overwhelms for both worldwide and stadia ventures. Concerning time defers the most critical contributing variable for worldwide activities was late postpone in instalments while for the stadia ventures plan related components brought about the most defers. The outcomes give important data on the one of a kind difficulty confronting the individuals who is occupied with putting or overseeing development ventures in South Africa. According to Kaming [5], the transcendent reasons for postponement are configuration changes, poor work profitability and lacking arranging. Utilizing component investigation methods, postpone and cost overwhelm variables were assembled into elements, and their connections dissected. In spite of the fact that Indonesia particular, the outcomes reflect development administration issues basic to creating nations.

Assaf [6] explain that the most widely recognized reason for deferral distinguished by all the three gatherings is "change request". Studies inferred that 70% of activities experienced time overwhelm and found that 45 out of 76 ventures considered were deferred.

According to Frimpong et al. [7], the aftereffects of the study uncovered the primary driver of deferral and cost overwhelms in development of groundwater ventures included: regularly scheduled instalment troubles from offices; poor contractual worker administration; material acquisition; poor specialized exhibitions; and acceleration of material costs.

Elinwa [8] observed that the variables that influence time invade in the Nigerian development industry have been contemplated, and the rank understanding component for the experts are modellers/engineers, 0.75; draftsmen/manufacturers, 0.83; amount surveyors/engineers, 0.74; amount surveyors/developers, 0.79; and engineers/manufacturers, 0.69. Imperative discoveries are (1) the level of event of time overwhelm is high—somewhere around 80 and 90%; (2) relative commitments of the customer, contractual worker, and others are 62, 32, and 6%, individually; (3) time invade is more proclaimed in government/open area ventures (89%); and (4) time overwhelm happens on all anticipates, independent of size.

Chan [9], show that the five primary and normal reasons for postponements are: "poor site administration and supervision," "unanticipated ground conditions", "low speed of basic leadership including all anticipate groups",

"customer started varieties" and vital varieties of works.

3. Methodology of work and data collection

This part of the study narrates the manner in which the research objective of the study would be achieved. This part describes the methods in which the data required would be gathered to answer the research questions. This section discusses the research methodology adopted, the data collection process, the sampling technique deployed and the data analysis technique to be used in the following steps. Data collection generally involves two methods primary data collection and secondary data collection. Primary data collection refers to the first and information that is collected from the respondents; in this case the respondents are project managers of construction projects. The respondents would be given research questionnaires' to fill and this data would be utilised for the purpose of data analysis. Secondary data refers to the information, which is gathered, from various sources such as the owner's documents who is the Ministry of higher education and scientific research, online journals, previous studies, online magazines and other sources such as books.

Data collected, reported and discussed. The questionnaire survey was carried out, the results that have been obtained from the processing of questionnaires using statistical package for social sciences SPSS. The Results are prepared to present the information about the ranking of causes affecting.

The time overrun on construction projects based on their relative mean ranks, in addition to the impacts of time overrun.

Has been proposed management system for the management of time overrun, this part focuses on the proposal management system to overcome the causes and effects arising as a result exceeded the time.

4. Causes of Time overrun

The causes of time overrun were analyzed statistically by using the Ranking which was calculated by utilizing the mean and the standard deviations was ascertained to Determine the scattering of the answer. Causes were positioned and arranged by significance rank arranged for every gathering (Owner, Consultant, Contractor and Others). Finally, data were analyzed by using importance indices for the overall data. The data analysis is shown in the following sections.

1. Causes related to Owner

The results in Table 1, it is apparent that cause no. (5) "Replacement of materials or procedures" was the most important cause addressed by the sample; has the highest (3.9) and ranked the highest rank. The cause number (2) "Change of schedule" was the

least critical cause; its mean is (2.6) and positioned the last rank. Alternate causes went between these two means as appeared in Table 1.

Table 1: Ranking for Causes related to owner

Causes related to owner	N	Arithmetic mean	Std. Deviation	Ranking
1- plan or scope changing	30	3.6	0.96609	4
2- Change of schedule	30	2.6	0.84327	7
3- Client financial problem	30	3.8	1.22927	3
4- Inadequate project objectives	30	2.7	1.1595	6
5- Replacement of materials or procedures	30	3.9	0.8756	1
6- change in specification by owner	30	3.6	0.96609	4
7- Delay in decision making process	30	3.8	0.91894	2
8- Obstinate nature of owner	30	3.1	0.73786	5

*N: Number of participants

Some participants stated that an important cause of time-overrun occurrence in construction projects is "Delivery delays because of financial dues by owner" or as some others express it by "The project site is not suitable".

II. Causes related to Consultant

Lists below shows results of analysis of the reasons of time overrun which is related to consultant. Table 2, show up the arithmetic mean, standard deviation and the ranking as following:

III. Causes related to contractor

Table 3, shows the rank for each causes of time overrun that is related to contractors according to the responses.

Some participants stated that an important cause of time-overrun occurrence in construction projects is "The Company's lack of experience" or as some others express it by "Sub-letting".

IV. Others related causes

Table 4, shows lists the analysis results of the others related causes, standard deviations and ranking.

V. Overall result for important causes

Table 5, presents the overall highest ranking of the time overrun causes and the origin of each of these causes. It could be noticed from the table that "Contractor's financial difficulties", which caused by contractor, was the most effective cause out of the overall causes that lead to time overrun as the mean is (4.8). It also noticed that the contractor was most popular reasons or for the occurrence of time overrun.

VI. Impacts of Time Overrun

The impacts of time overrun were analyzed statically. The ranking calculated by using the arithmetic mean and the standard deviation. The impacts ranked depending on the importance as shown in Table 6.

The "Cost increasing, over heads expenses increasing", Quality degradation", are the most important; there mean is (4.2) while "Poor safety conditions", is the least important impact addressed; its mean is (2.7).

VII. Research Hypothesis Test

Means shows to identify the most important reasons and effects of time overrun. There is a need for proving statistically that there is a correlation between the reasons and effects of time overrun so that the hypothesis of the research is to prove that "the causes of time overrun in projects needed to study for controlling their effects.

This can be achieved by hypothesis testing and use (multiple linear regression & t- test). Null hypothesis - H0: There is no impact of time overrun causes on time overrun effects in the construction projects from the project participant's view at (0.05 level).

Alternative hypothesis – H1: There is an impact of time overrun causes on time overrun effects in projects from the project participant's view at (0.05 level).

In Table 7 shows the multiple linear regression of testing the effect of time overrun causes on time overrun impacts in the construction projects from the project participant's responses. The following resulted regression model represents the relation between time overrun causes and impacts:

$$Y = 5.110 + 0.253 X_1 + 0.408 X_2 + 0.249 X_3 + 0.302 X_4$$

(1)

Such that:

Y: Impacts of time overrun.

The multiple correlation coefficients (R), is a measure of the strength of the linear relationship between time-overrun impacts and the set of causes. The calculated value of (R) which is (0.754), suggesting a strong positive effect of time overrun causes on their impacts. The (F) Value is a statistical test used to decide whether the model as a whole has statistically significant predictive capability. The calculated (f) value is (1.651) which shows a significant statistical

X1: Owner related causes.

X2: Consultant related causes.

X3: Contractor related causes.

X4: Others related causes.

relation to time overrun impacts as the value of the significance level (0.000) related to (f) values was less than 0.05 suggesting the presence of the relationship. The value of coefficient of multiple determinations (R²) shows how much the independent variable (causes) share to explain the variability in the dependent variable (impacts). Upon this idea, all the causes being studied in the current study explain (56.9 %) of the variability in time overrun impacts.

Table 2: Ranking for Causes related to Consultant

Causes related to Consultant	N	Arithmetic mean	Std. Deviation	Ranking
9- Design changing by consultant	30	3.9	0.8756	4
10- Errors and omissions in design	30	3.9	0.8756	4
11- Conflict between contract documents	30	4.1	0.73786	2
12- Inadequate scope of work for contractor	30	3.7	0.67495	5
13- Lack of coordination	30	2.9	1.1005	11
14- Design complexity	30	2.9	1.28668	12
15- Inadequate working drawing details	30	3.4	1.3499	6
16- Inadequate shop drawings details	30	4	1.05409	3
17- Consultant lack of judgment and experience	30	4.2	0.78881	1
18- Lack of consultant's knowledge of available materials and equipment	30	3.9	0.99443	4
19- Lack of required data for the consultant	30	3	1.05409	9
20- Ambiguous design details	30	3	1.1547	10
21- Inadequate design	30	3.4	0.84327	6
22- Noncompliance of design with government regulations	30	3.2	0.91894	8
23- Noncompliance of design with owner requirements	30	3.2	0.78881	7
24- Change in specifications by consultant	30	3.7	0.94868	5

Table 3: Ranking for Causes related to Contractor

Causes related to Contractor	N	Arithmetic Mean	Std. Deviation	Ranking
25- Unavailability of equipment	30	4.2	0.78881	3
26- Shortage of skilled manpower	30	4.4	0.5164	2
27- Contractor's financial difficulties	30	4.8	0.42164	1
28- Contractor's desired profitability	30	3.9	1.19722	8
29- Differing site conditions	30	3.3	1.1595	12
30- Defective workmanship	30	4	0.66667	5
31- Unfamiliarity with local conditions	30	3.5	0.84984	11
32- Lack of specialized construction manager	30	3.8	0.78881	9
33- Lack of communication	30	3.9	0.73786	7
34- Contractor experience deficiency	30	4	1.1547	6
35- Long lead procurement	30	4.1	0.99443	4
36- Lack of strategic planning	30	3.7	0.48305	8
37- Contractor's lack of required data	30	3.6	1.07497	10

Table 4: Ranking for Causes related to others

Causes related to Others	N	Arithmetic Mean	Std. Deviation	Ranking
38- Weather conditions	30	3.3	1.05935	3
39- Safety considerations	30	2.7	1.1595	4
40- Socio-cultural factors	30	3.3	1.05935	3
41- Change in government regulations	30	3.7	1.33749	2
42- Change in economic conditions	30	4.4	0.5164	1

Table 5: Ranking for Overall Causes

Overall result	Mean	Rang	Origin of time overrun causes
1- Contractor's financial difficulties	4.8	1	*contractor
2- Shortage of skilled manpower	4.4	2	*contractor
3- Change in economic conditions	4.4	2	others
4- Consultant slack of judgment and experience	4.2	3	consultant
5- Unavailability of equipment	4.2	3	*contractor

Table 6: Ranking for the effect of time overrun

Impacts of time overrun	N	Mean	Std. Deviation	Importance ranging
1- Increase in project cost(cost overrun)	30	4.2	0.91894	2
2- Increase in overhead expenses	30	4.2	0.78881	1
3- Quality degradation	30	4.2	0.78881	1
4- Productivity degradation	30	4.1	0.8756	3
5- Tarnish firm's reputation (claims and debate results from variety may influence the company's notoriety).	30	3.4	1.26491	5
6- Safety conditions was poor.	30	2.7	0.67495	6
7- Disputes among professionals	30	3.7	0.94868	4
8- Additional payments for contractor	30	2.7	1.1595	7

Table 7: the multiple linear regression results of analysis to test the Effect of time overrun Causes on time overrun Impacts

variables	R	R2	f	sig(f)	T	sig(t)	Beta
(Constant)					2.78	0.039	
owner					1.207	0.281	0.363
Consultant	0.754	0.569	1.7	0.3	1.247	0.267	0.435
Contractor					0.589	0.581	0.242
others					1.342	0.237	0.631

5. Revision of Existed Projects Documents for Time Overrun

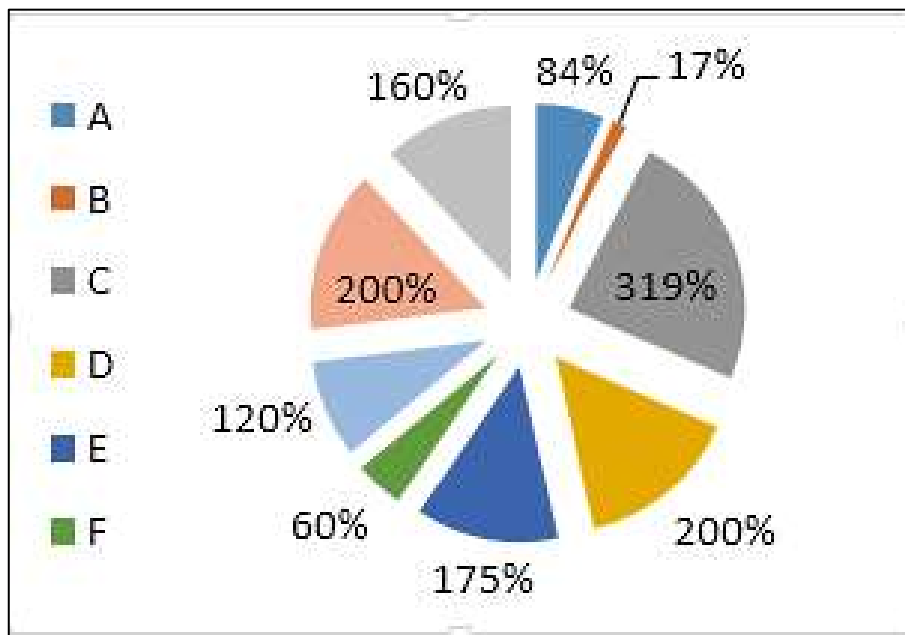
Data of time overrun have been collected from real life existed construction projects.

The data analyzed to determine the percentage of time overrun and the most popular causes.

The most popular causes of time overrun in the nine selected projects were (change in economic condition and Company's lack of experience) (at Table 8, and the percentage that summarizes of time overrun (shown in Figure 1).

Table 8: Existed Projects Documents for Time Overrun

Project	Original Contract duration (days)	Time of delay	% of delays from contract original duration	causes
A	455	(840)	84%	1-Delay in decision making process 2- Consultant slack of judgment and experience
B	410	(480)	17 %	1- Company's lack of experience 2- Client financial problem
C	365	(1530)	319%	1- Contractor's financial difficulties
D	420	(1260)	200%	1- Change in economic conditions 2- Company's lack of experience
E	240	(660)	175%	1- Consultant slack of judgment and experience 2- The project site is not suitable
F	450	(720)	60%	1- Change in economic conditions 2- Shortage of skilled manpower
G	365	(820)	120%	1- Change in economic conditions
H	240	(720)	200%	1- Company's lack of experience
I	270	(700)	160%	1- owner financial problem

**Figure 1: percentage of time overrun**

6. Proposals to Control the Time Overrun

The comments, which are below listed, are suggestions for control the time over-run impacts:

1. Choose an expert designer who will promise a complete design.
2. Conduct exact site examinations must be done to guarantee correct design inputs.
3. Make the gap between design stage and construction as short as possible to keep away from future changes in site conditions

4. Produce record drawings (as built drawings) at the final of each project to utilize as a kind of perspective for future ventures.

5. Revise the strategy of contract awarding (i.e. fixation on both specialized and money related offers to be put together by bidders amid offering arrange and not just focus on monetary offer as determination criteria).

6. Prepare good, detailed design and drawings including clear specialized details alongside sensible plans and timetable.

7. Give the consultants a long time for reviewing the design in order to have definite outline with least conceivable changes.

8. Pick reasonable persons with a profoundly effective and handy experience in the preparation of BOQ project.
9. Direct contracting with a respectable and specific organization.
10. Completion of all preliminary requirements for the project site (such as the ownership of the site and the borders of the site that the project is implemented).
11. The formulation of the contract correctly, legally and clear
12. Continuous coordination between the owner, the consultant, and the contractor.

7. Results

Time overruns is a severe problem faced by large construction in Iraq. It is resulted from various factors, which had been identified in this study. 42 causes were found as valid and analyzed statistically using relative importance index method. It was found that five most significant factors causing time overruns in construction project in Iraq are (Contractor's financial difficulties, Shortage of skilled manpower, Change in economic conditions, Consultant slack of judgment and experience, Unavailability of equipment).

The contractor was the most popular origin or initiator for the occurrence of time overrun. Examining some finished projects, the following factors were determined the most popular as following (change in economic condition and Company's lack of experience). The high percentage that summarizes of time overrun in the nine selected projects were 319%. The second objective of this research was to identify the common effects due to construction variation orders, which were (Increase in project cost, Increase in overhead expenses, Quality degradation), so this means that there is a need for urgent attention is to be placed on these factors to avoid time overrun in Iraq.

References

- [1] A. Enshassi, M. Kumaraswamyb and J. Al-Najjar "Significant Factors Causing Time and Cost Overruns in Construction Projects in the Gaza Strip: Contractors, Perspective," *International Journal of Construction Management*, 10, 1, 35-60, 2010.
- [2] I. Mahamid "Common Risks Affecting Time Overrun in Road Construction Projects in Palestine:

Contractors Perspective," *Australasian Journal of Construction Economics and Building*, 13, 2, 45-53, 2013.

- [3] D. Berteau, J. Hofbauer, G. Sanders, G. Ben-Ari J. Ellman and D. Morrow "Cost and Time Overruns for Major Defense Acquisition Programs: An Annotated Brief," Dudley Knox Library, 2011.

[4] L. Baloyi and M. Bekker "Causes of Construction Cost and Time Overruns: The 2010 FIFA World Cup Stadia in South Africa," *Acta Structilia*, 18, 1, 51-67, 2011.

[5] P.F. Kaming, P.O. Olomolaiye, G.D. Holt and F.C. Harris "Factors Influencing Construction Time and Cost Overruns on High-Rise Projects in Indonesia," *Construction Management and Economics*, 15, 1, 83-94, 1997.

[6] S.A. Assaf and S. Al-Hejji "Causes of Delay in Large Construction Projects," *International Journal of Project Management*, 24, 4, 349-357, 2005.

[7] Y. Frimpong, J. Oluwoyeb and L. Crawfordc "Causes of Delay and Cost Overruns in Construction of Groundwater Projects in a Developing Countries; Ghana as a Case Study," *International Journal of Project Management*, 21, 5, 321-326. 2003.

[8] A.U. Elinwa and M. Joshua, "Time-Overrun Factors in Nigerian Construction Industry," *Journal of Construction Engineering and Management*, 127, 5, 419-425, 2011.

[9] W.M. Daniel Chan and M.M. Kumaraswamy "A Comparative Study of Causes of Time Overruns in Hong Kong Construction Projects," *International Journal of Project Management*, 15, 1, 55-63, 1997.



Author(s) biography

Name Tareq Abdulmajeed Khaleel, was born in Mannheim- Germany 1971. 1993 B.Sc. in civil engineering

from Al-Mustanseria University, 2001 M.Sc. in construction project management from the University of Technology- Baghdad. Ph.D. in construction project management from the University of Technology, Baghdad.



Name: Enas Zaki Hadi, was born in Iraq 1989, MBA (Master's in Business Administration)

Concentration: Engineering Project Management, from Isra University, Amman, Jordan (2012-2014) B.Sc. in Materials Engineering, from AL-Mustanseria University, Baghdad, Iraq (2007-2011).