

# Unwanted Delay Types Imposed on Main Contractors in the Construction of Town Houses in Dubai U.A.E

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Received: February 5 2014

Accepted: April 19 2014

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## ABSTRACT

A construction contract normally have a specified duration provided by clients and agreed by contractors to complete the work. If the contractor is unable to execute a project within the contracted duration, then the client has the right under construction contract to impose liquidated damages (LDs) on the contractor's breach for delay. However, there are some conditions which the contractor is not fully in charge of the time overrun and problems are imposed by other parties involved in the projects. The aim of this study is to identify the types of problems faced by the contractors in the construction of the Town House project due to Nominated Sub-Contractor, variation orders and nominated supplies. Interview and questionnaire survey platforms are selected for the purpose of data collection. 26 potential problems are recognized through interview sessions with experts and 25 of them obtained agreement of the questionnaire survey. Results of this study can offer a transparent platform to find solutions for the imposed problems on the contractors by the other parties.

**KEYWORDS:** Construction contract; Time and Budget overrun; Nominated supplier; Nominated sub-contractor; delay.

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## 1. INTRODUCTION

It is commonly observed that projects are not executed according to the planned schedules due to various issues of delay. Delays in the project can make significant changes like acceleration, slow productivity, exceed budgets and finally contract termination. Delays are categorized into excusable and non-excusable. Excusable delays are regularly due to contractor's fault and relieve the contractor of liability for liquidated damages[1, 2]. Non-excusable delays are usually due to the Client/Engineer's contribution and extreme weather conditions. It is complicated in nature to predict these type delays[3]. A delay in a task may or may not influence the project completion date. Meanwhile, a delay caused by one party may or may not influence the project completion date. Furthermore, a delay can occur without any party's fault like extreme weather [4, 5].

In any construction project the elements of time, cost and quality are important for the client. The client wants the project to be delivered on time, within the budget and within a reasonable quality[6, 7]. The parties involved in the construction of the projects are the clients, contractors, domestic sub-contractors, nominated sub-contractors, nominated suppliers, domestic suppliers and etc. The selection of the sub-contractors through tendering is important. However, some of the clients favored the lowest tenderer. The main structural works are carried out by the main contractor and the electrical and mechanical works are normally done by the nominated sub-contractor. Some of the clients want to get involved with the supplying of materials to the contractors. The main contractor will have to depend on the client's nominated suppliers to deliver the materials. Instead of reducing the cost of the project, the material suppliers would pose problems to the successful completion of the project. Apart from the suppliers, the nominated sub-contractor also at times would contribute to the delay of the project [8-10].

Nominated sub-contractors and nominated suppliers are creating legally and practically difficulties in execution of works. The main issue is imposing sub-contractor on the contractor without his consent [11]. Since a consequence under clause 58 and 59 [12] the employer may happen to be financially liable for losses resulting from the nominated sub-contractor's breach [13].

Under clause [12] 52.1, Valuation of Variations, after receiving the variation order, contractor submits his variations or additional works quotations to the employer and also submits the estimation of delays for approval. The agreement between the employer and the contractor has been bound for the value of the varied work and the time to complete the varied works. As a result delays would occur due to variation.[13]

Under clause (FIDIC, 1987) 58.1 Provisional Sums means a sum included in the contract and so designed in the Bill of Quantities for the execution of any part of the works or for the supply of goods, materials by the client.

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The issue is that client is supplying material through his nominated supplier behind the schedule. As a result delays would occur due to late supply of materials by the client to the contractor [14, 15]. As a holistic view on the previous clauses and researches which exposes the main contractors to unwanted delays and despite of the fact that there is need for identifying problems which can be imposed by nominated sub-contractors, nominated supplier and the variation in order on the client, this study is mainly conducted to identify those problems. The case study of this project is conducted at the construction project in Dubai, United Arab Emirates. Furthermore, the conditions of contract applicable between the client and the contractor is the conditions of contract for works of civil engineering construction (Fourth Edition-1987)[16].

## 2. DATA COLLECTION

### 2.1. Interview

The research aim of this paper is to identify those of problems that main contractors are primarily suffering from Nominated sub-contractor, Nominated supplier and variation in orders. To fulfill the aim of this paper, first, eighteen interview sessions were held with project managers and civil engineers of construction projects in the construction of town houses in Dubai U.A.E which have over ten years of field experience. Fourteen people were interviewed individually and for the rest a group interview was held. The output of the interview sessions were to recognize twenty six potential problems which can be imposed by nominated sub-contractors, nominated suppliers and the variation in order and tabulated in Table 1. 13 problems were related to the nominated Sub-Contractors, 8 related to variation orders and 5 for the nominated suppliers.

Table 1: Potential Delay factors related to nominated sub-contractors, nominated suppliers and the variation in order

Item	Statement	Category
1	Nominated Sub-Contractors don't have enough manpower to execute the work.	Problems related to the Nominated Sub-Contractors
2	Nominated Sub-Contractors don't have enough material to execute the work.	
3	Nominated Sub-Contractors don't have enough machinery to execute the work.	
4	Nominated Sub-Contractors don't have enough cash flow to execute the work.	
5	Nominated Sub-Contractors have direct relationships with client to execute the part of work without approval of consultant.	
6	Nominated Sub-Contractors have direct relationships with client to execute the part of work without information of main contractor.	
7	Nominated Sub-Contractor's staff doesn't have good relationships with main Contractor's staff.	
8	Nominated Sub-Contractors caused the delay of the project.	
9	Working coordination is poor between main Contractor and Nominated Sub-Contractor.	
10	Nominated Sub-Contractors are wasting the materials of main Contractor.	
11	Nominated Sub-Contractors have disputes during work with main Contractor.	
12	Nominated Sub-Contractors are not working as per planned schedule given by main Contractor.	
13	Owner/Consultant's selection of Nominated Sub-Contractor is not satisfactory according to the project requirement.	
14	The owner's financial problems changed the project scope.	
15	The owner's replacements of material to fulfill certain requirements slowed the productivity of the workers.	
16	The owner's changes in scope of work resulted in the change of the project planned schedule.	
17	Additional quantities of works or materials need extra manpower and equipment to complete the task.	
18	Design changes changed the project scope.	
19	Unclear drawings details slowed the work progress	
20	Lack of consultant's knowledge of available materials and equipment changed the project budget.	
21	Errors and omissions in design delayed the project performance.	Problems related to the Nominated Suppliers
22	The Client's financial problems delayed the supply of materials.	
23	The Client's delay in approval of materials resulted in the delay of the project task to complete the work.	
24	The Client's late supply of material changed the project planned schedule.	
25	Lack of consultant's knowledge of available materials delayed the project task.	
26	The Client's financial problems resulted in the replacement of cheaper materials to complete the work.	

### 2.2. Questionnaire survey

For the purpose finding agreement on the recognized potential problems, questionnaire approach was selected. Questionnaire was developed and distributed online by means of emails. The respondents were within the construction of town houses in Dubai U.A.E. Targeted sample for the study was concentrated on the professionals working in the construction industry like: Project managers, Project engineers, and Site engineers. In order to generalize the results, it is necessary to select a sample that has adequate years of experience in the construction sites. Thus, respondents were selected on the basis of their experience of working in the construction sites and

minimum experience of five years is acceptable, as the respondent with less experience do not have enough projects experience to answer the questionnaire and also can make data unreliable.

The designed questionnaire consists of four sections containing total 30 numbers of questions. Section one contain four questions designed to obtain general information about respondents. Sections two to four consists of twenty six questions aim to obtain agreement of respondents on the Problems related to the Nominated Sub-Contractors, Problems related to Variation orders and Problems related to the Nominated Suppliers.

In section one respondent other than their names were requested to choose a relevant answer from multiple choices. Questions in section one assesses:

- Type of their company (Consultant, main contractor, client, sub-contractor and supplier);
- Occupation of the respondent; and
- Years of experience in the construction sites.

Section two to four of the questionnaire questionnaires has been analyzed using the mean value. The feedbacks provided by respondents are categorized into five options, Strongly Agree, Agree, Moderately Agree, Disagree and Strongly Disagree. The Multiple-choice questions require the anticipation of the whole range of likely answers, which would be given and formulating the options [17, 18]. The multiple-choice questions are based on rating scale of five ordinal measures of agreement towards each statement (from 1 to 5) as shown in Table 2 below.

Table 2: Description of Likert based qualitative values

Rating	Category	Mean Index
1	Strongly Disagree	1.00 ≤ Average Index < 1.50
2	Disagree	1.50 ≤ Average Index < 2.50
3	Moderately Agree	2.50 ≤ Average Index < 3.50
4	Agree	3.50 ≤ Average Index < 4.50
5	Strongly Agree	4.50 ≤ Average Index ≤ 5.00

Total 100 questionnaires were sent to the targeted group by means of email. 63 questionnaires were returned with 63% response rate. For postal surveys in the construction industry, above 30% response rate is considered satisfactory [19].

Respondents consists of 41% Project Engineers, 22% Project Managers, 7% Planning Engineers, 6% Quantity Surveyors, 6% Electrical Engineers, 7% QA/QC Engineers and 11% Site Supervisors. 47% of respondents have above 15 years of experience, 30% have 10 to 15 years of experience and 23% have 5 to 10 years of experience. This indicates that the data of this study has been collected mostly from respondents with adequate experience in construction industry. 48% respondents work with main Contractors, 22% work with Consultants, 12% work with Clients, 10% work with sub-contractors and 8% work with suppliers.

### 3. DATA ANALYSIS AND RESULTS

The reliability of data was determined by calculating Cronbach’s alpha ( $\alpha$ ). Cronbach’s alpha ( $\alpha$ ) is a test which estimates the internal consistency of the variables through a single test administration. Cronbach’s alpha is the mean value of all reliability coefficients that may be achieved for all potential combinations of items when split into two half tests [20]. For data collected coefficient value ( $\alpha$ ) of 0.982 was derived, which is considered excellent. The data is considered reliable and can be further analyzed.

The data analysis to evaluate the Nominated Sub-Contractor related problems are represented by 13 items. The study result findings are shown in Table 3 as bellow.

Table 3: Problems related to the Nominated Sub-Contractors

Rank	Statement	SD	D	MA	A	SA	Mean
		f (%)	f (%)	f (%)	f (%)	f (%)	
3	Nominated Sub-Contractors don't have enough manpower to execute the work.	0	0	4	37	22	4.29
		0.00%	0.00%	6 %	59%	35%	
4	Nominated Sub-Contractors don't have enough material to execute the work.	0	0	4	45	14	4.16
		0.00%	0.00%	6 %	71.4%	23.6%	
1	Nominated Sub-Contractors don't have enough machinery to execute the work.	0	0	4	21	38	4.54
		0.00%	0.00%	6 %	33.33%	60.66%	
9	Nominated Sub-Contractors don't have enough cash flow to execute the work.	0	0	29	29	5	3.62
		0.00%	0.00%	46 %	46%	8%	

11	Nominated Sub-Contractors have direct relationships with client to execute the part of work without approval of consultant.	0	0	29	34	0	3.54
		0.00%	0.00%	46%	54%	0.00%	
12	Nominated Sub-Contractors have direct relationships with client to execute the part of work without information of main contractor.	0	0	30	33	0	3.52
		0.00%	0.00%	47.67%	52.33%	0.00%	
8	Nominated Sub-Contractor's staff doesn't have good relationships with main Contractor's staff.	0	0	5	55	3	3.97
		0.00%	0.00%	7.9%	87.3%	4.8%	
13	Nominated Sub-Contractors caused the delay of the project.	0	0	38	25	0	3.40
		0.00%	0.00%	60.30%	39.70%	0.00%	
6	Working coordination is poor between main Contractor and Nominated Sub-Contractor.	0	0	4	54	5	4.01
		0.00%	0.00%	6%	86.10%	7.9%	
9	Nominated Sub-Contractors are wasting the materials of main Contractor.	0	0	29	29	5	3.62
		0.00%	0.00%	46%	46%	8%	
7	Nominated Sub-Contractors have disputes during work with main Contractor.	0	0	6	51	6	4.00
		0.00%	0.00%	9.5%	81%	9.5%	
2	Nominated Sub-Contractors are not working as per planned schedule given by main Contractor.	0	0	4	27	32	4.44
		0.00%	0.00%	6%	42.8%	51.12%	
5	Owner/Consultant's selection of Nominated Sub-Contractor is not satisfactory according to the project requirement.	0	0	8	37	18	4.16
		0.00%	0.00%	12.7%	58.7%	28.6%	

From the results of section two, which is tabulated in the table 2, it can be determined that most of potential problems have gained agreement (mean value of above 3.50), except item "Nominated Sub-Contractors caused the delay of the project" with mean value of 3.40. "

The data analysis for the section 3 which is to investigate the variation orders related problems that caused the time and budget overrun of the project are tabulated in table 4 below. This section includes 8 items.

Table 4: Problems related to Variation orders

Rank	Statement	SD	D	MA	A	SA	Mean
		f (%)	f (%)	f (%)	f (%)	f (%)	
7	The owner's financial problems changed the project scope.	0	0	10	37	16	4.08
		0.00%	0.00%	15.9%	58.7%	25.4%	
3	The owner's replacements of material to fulfill certain requirements slowed the productivity of the workers.	0	0	0	24	39	4.62
		0.00%	0.00%	0.00%	38.1%	61.9%	
1	The owner's changes in scope of work resulted in the change of the project planned schedule.	0	0	0	21	42	4.67
		0.00%	0.00%	0.00%	33.33%	66.67%	
4	Additional quantities of works or materials need extra manpower and equipment to complete the task.	0	0	0	26	37	4.59
		0.00%	0.00%	0.00%	41.2%	58.8%	
6	Design changes changed the project scope.	0	0	3	38	22	4.22
		0.00%	0.00%	4.7%	60.3%	35%	
2	Unclear drawings details slowed the work progress.	0	0	0	23	40	4.64
		0.00%	0.00%	0.00%	36.5%	63.5%	
8	Lack of consultant's knowledge of available materials and equipment changed the project budget.	0	0	3	55	5	4.03
		0.00%	0.00%	4.7%	87.4%	7.9%	
5	Errors and omissions in design delayed the project performance.	0	0	0	30	33	4.52
		0.00%	0.00%	0.00%	47.6%	52.4%	

The results of questionnaire survey for section 3 indicate a complete agreement of the respondents regarding to the identified problems related to variation orders. Five of items received strongly agreement which highlights good performance of the interview sessions.

Questionnaire survey of the section 4 seeks agreement of the respondents on the nominated supplies related problems in the construction of the project. The task is represented by 5 items. The study result findings are shown in Table 5 as follow.

**Table 5: Problems related to supply of materials**

Rank	Statement	SD	D	MA	A	SA	Mean
		<i>f (%)</i>	<i>f (%)</i>	<i>f (%)</i>	<i>f (%)</i>	<i>f (%)</i>	
3	The Client’s financial problems delayed the supply of materials.	0	0	0	30	33	4.71
		0.00%	0.00%	0.00%	47.6%	52.4%	
2	The Client’s delay in approval of materials resulted in the delay of the project task to complete the work.	0	0	0	18	45	4.75
		0.00%	0.00%	0.00%	28.5%	71.5%	
1	The Client’s late supply of material changed the project planned schedule.	0	0	0	16	47	4.76
		0.00%	0.00%	0.00%	25.4%	74.6%	
4	Lack of consultant’s knowledge of available materials delayed the project task.	0	0	3	37	23	4.31
		0.00%	0.00%	4.7%	58.7%	36.6%	
5	The Client’s financial problems resulted in the replacement of cheaper materials to complete the work.	0	0	6	37	19	4.21
		0.00%	0.00%	9.5%	58.7%	31.8%	

Results of survey indicate the agreement of the respondents for the proposed major problems of nominated supplier. Among those items, three has gained strongly agreement which are mostly depend on the client behavior regarding to the nominated supplier.

**4. RESULTS AND CONCLUSION**

This study was initiated with the aim of identifying those of problems which can cause time and cost overruns due to factors imposed on the main contractors. Literature review indicates that the main type of these problems are related to the Nominated Sub-Contractors, Variation orders and the Nominated Suppliers. Various interview sessions with extensively experienced expert were conducted and total number of 26 major problems within three categories were identified. In order to verify these outputs, questionnaire survey within the different construction parties was conducted. Results of the questionnaire survey was validated through internal consistency test (Cronbach's Alpha). Section one of questionnaire confirms having adequate and appropriate respondents range.

Section two to four have receive agreement of the respondents for majority of the items. In section two, “Nominated Sub-Contractors don’t have enough machinery to execute the work” has received strongly agreements that main contractors should be more aware of their sub-contractor machinery potential. Also not working with the scheduled plan from sub-contractor side are the next priorities among the major problems. It indicates weak communication and collaboration of contractors and sub-contractors. Lack of manpower is in the third priority that requires clients more collaboration for selecting a suitable nominated sub-contractor. Also the rest of the problems which received agreement of the respondents require attentions of the parties involved in the construction of town houses in Dubai U.A.E.

In section three, “The owner’s changes in scope of work resulted in the change of the project planned schedule” has gained first rank which highlights how preliminary studies are efficient in the time and budget overruns. Unclear drawings details and unexpected works which requires more manpower are the other major difficulties and contractors should be prepared for such situations.

It can be derived from section four that behavior of the client regarding nominated supplier has unquestionable influence on the time and budget overruns. Late approval of the supplied materials, late supplying of the materials and client’s financial problems are the significant problems imposed on the main contractors. Besides all the identified potential problems which are identified through this study, there is need for determining some suitable and appropriate approaches to overcome these type of imposed problems.

**Acknowledgment:**

The authors declare that they have no conflicts of interest in this research.

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