CONSTRUCTION FACTORS THAT CAUSING REWORKS IN DOWNSTREAM ACTIVITIES DUE TO OVERLAPPING

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ABSTRACT

Reworks due to activities overlapping have both direct and indirect effects on the performance of construction projects. To reduce the impact of reworks there is a need to understand their basic reason for their existence. This paper aims to identify the top changes that affecting upstream production rate and causing reworks in downstream activities. These changes were identified through three stages. The first stage 23 changes were collected from a past literature review and were divided into three major categories: designer, contractor, and owner changes. 100 effective interviews were conducted and their results are employed. In the second stage, the 23 changes were then ranked from the most significant to the less significant. The third stage, the 80/20 rule applied to the changes identified to get the eight top important changes. The result shows the top important eight factors are Lack of coordination and poor communication, The contractor instruction to modify a design, Non-compliance with the specification, The owner instruction to modify a design, Incomplete design at the time of tender, Poor planning and coordination of resources, Errors made in the contract documentation and Lack of experience and knowledge of the design and construction process.

Keywords: Fast Tracking, Activities Overlapping, Rework Time, Construction Schedule, AHP

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1. INTRODUCTION

Rework in construction projects is defined as Activities in the field that have to be done more than once in the field, or activities that remove work previously installed as part of the project regardless of source, where no change order has been issued and no change of scope has been identified by the owner (Jason and James, 2018). Construction project time overrun is defined as an addition of time further than the agreed contractual time at the tender stage. Rework can lead to a considerable addition of a project's time and cost overrun, especially during the construction stage. The effect of delays or time overruns for the contractor included increased costs, reduced profit margin, and battered reputation (Eze and Idiake, 2015).

2. LITERATURE REVIEW

Resource-constrained project scheduling is the process of constructing a project schedule within the limited amount of resources available. It requires the examination of the possible unbalanced use of resources over time to resolve over-allocation (the so-called resource conflicts) when more resources are required than available. When more resources such as machines or people are needed than there are available, these activities will have to be rescheduled concurrently or even sequentially to resolve the resource constraints. Hence the resource-constrained project scheduling is the process of resolving these resource conflicts under different scheduling objectives (Vanhoucke, 2012). Abeku et al., (2017) mentioned that the factors that causing rework during construction are poor management and employee training, the low skill level of sub-contractors, lack of supervision and on-site inspection damage due to carelessness, poor planning, and coordination of site resources, and poor workmanship and use of materials. The accuracy of the drawings, the number of design errors, omissions, and ambiguities within the plans and specifications that affect the quality of the facility are identified according to Musa and Obaju (2016). Dosumu et al. (2017) concluded that errors in contract documents are frequently caused by clients' change of design and specifications, lack of adequate time to prepare contract documents use of inexperienced designers to prepare contract documents, oversight, negligence, and laziness. Fast-tracking can result in rework and increased risk. This approach can require work to be performed without completed detailed information, such as engineering drawings. It results in a trading cost for time and increases the risk of achieving the shortened project schedule (PMBOK, 2004). Sen et al., (2018) concluded that the lack of experience and knowledge of design and construction process, poor quality of construction technique, and poor use of advanced engineering are more responsible for rework in the construction process. Enshassi et al., (2017) indicated that the most important rework causes that have a significant impact on project performance are: attempt to fraud, competitive pressure, ineffective management, schedule pressure, and the absence of job security.

A summary of a huge number of different scheduling objectives and the studies of modeling construction schedule was developed and reproduced in Table 1. These factors which are gathered are forty one which affects the construction schedule. The effects of rework include: Lost of profit by the contractor, extra project cost to the client, schedule delay, reduced project performance, and changed project outlook (Love et al., 2004).

Table 1 A summary of factors affecting construction schedule according to different authors

Authors	year	Factors Affecting Construction Schedule	No. of Factors
Jing Liu and Ming Lu, [7]	2018	1) Crew Limits, 2) Technical Precedence Relationships, 3) Predefined Deadline, 4) Multiple Activity Modes, 5) Material Logistics, 6) Material Inventory and Material Supply 7) Crew Availability, 8) Material Demand of Each Activity and 9) Crew Resource Demand of Each Activity.	9
RazaviAlavi and AbouRizk, [12]	2017	<u>Site layout planning has an effect on construction schedules:</u> 1) Costs for Mobilization and Demobilization of Facilities, 2) Transportation Cost of material, workers and Equipment and 3) Rent Cost of off-Site Storage	3
Arashpour et al., [2]	2015	<u>Cash Constraints:</u> 1) Direct Capacity Balancing, 2) Partial Skill Chaining, 3) Closed Skill Chains, 4) Hybrid Cross-Training, and 5) Full Cross-Training.	5
El-Abbasy, [5]	2015	<u>Finance-based scheduling:</u> 1) Interest Rate, 2) Credit Limits, 3) Establishing Bank Overdrafts. <u>Cash Flow:</u> 1) Project Direct Cost Disbursement, 2) Expenses of Overheads, 3) Taxes, 4) Mobilization, and 5) Bond at Period. <u>Resources:</u> 1) The Total Amount of Resources, 2) Total Daily Resource Fluctuations, 3) Maximum Resource Demand During The Entire Project Duration and 4) The Total Number of Idle and Non-productive Resource Days.	12
Pakgohar, [15]	2014	<u>Single Project Scheduling:</u> 1) Single-Mode or Multi-Mode, 2) Multiple Renewable Resource and (Multiple) Non-Renewable Resource, 3) Precedence Relations, 4) Precedence Constraints	4
Chen and Weng, [3]	2009	A project consists of a set of interrelated activities. <u>Each activity:</u> 1) Execution Modes, 2) Activity Duration, 3) Activity Cost, 4) Precedence Relationship, 5) Resource Requirements, 6) Overlap, 7) Interruption, 8) State of The Activity.	8
Total Factors Affecting Construction Schedule			41

Upstream work should there be a change in upstream information. The information exchanged is also associated with a level of uncertainty depending on the type of upstream activity in question. Future upstream information modifications require to rework in the downstream activity to address the changes of the initial information based on which the downstream has started. The resulting rework usually consumes resources (e.g. time and money) and is disruptive to the flow of the downstream work.

The following sections present the research steps to achieve the objectives. An exploratory survey was carried out to identify factors affecting upstream production rate and causing reworks in downstream activities.

- The different causes of changes affecting upstream production rate and causing reworks in downstream activities were gathered through a comprehensive literature review.
- A questionnaire survey was conducted to identify the most important factors of those causing reworks in downstream activities depending on the overlapping degree.

The objectives of this research are outlined as follows:

- Identifying the different factors affecting upstream Production rate and causing reworks in downstream activities
- Ranking these factors according to their relative importance to find out the most important factors
- Develop practical recommendations and guidelines to time reworks effect in downstream activities.

3. QUESTIONNAIRE SURVEY

In this survey, thirty-nine (39) factors affecting upstream production rate and causing reworks in downstream activities as shown in Table 2. Then, a brainstorming session was conducted to reduce the number of these factors and get the most important factors and remove the repeated factors. Three main categories (designer, owner, and contractor factors) as shown in Table 3, the selected twenty-three (23) factors were ranked according to their relative importance to find out the most important factors of causing factors affecting upstream production rate and causing reworks in downstream activities.

Table 2 Summary of Changes Arising in Upstream Activities and Causing Reworks in Downstream Activities According to Different authors (Soliman, 2021)

Authors	year	Changes arising in upstream activities and causing rework in downstream activity	No. of Factors
Aman Sen, et al., [2]	2019	1) Lack of experience and knowledge of design and construction process, 2) Poor quality of construction technique, 3) Poor use of advanced engineering, 4) Adverse natural condition, 5) Lack of use of advanced mechanical equipment.	5
Enshassi et al., [8]	2017	1) Competitive pressure / low contract value, 2) Ineffective management and decision-making, 3) Schedule pressures, 4) The absence of job security, 5) Competitive pressure / low contract value, 6) An insufficient skill level, 7) Emergency conditions, 8) Poor quality system, 9) Disturbances in personnel planning and 10) Adulterated Materials	10
Wakefield et al.,[21]	2014	1) Contractor Field Management, 2) external environment, 3) contract management, 4) subcontractor management, 5) design management, 6) project communication management, 7) project plan changes, 8) changes for quality improvement 9) project scope management, 10) client management and 11) project process management	11

Love and Li, [12]	2000	1) Errors, 2) Omissions, 3) Failures, 4) Damage, and 5) Change Orders.	5
Mohammad and Majid,[14]	2019	1) Improper handling of material and delivery, 2) Unclear project management Process, 3) Poor sub-contractor management, 4) Poor design constructability or misunderstanding of the design, 5) Precedence Constraints, 6) The need to categorize the complicated operations, 7) Lack of standard method statements, 8) Poor clear contracting with sub-contractors and executive staff.	8
Total Factors Affecting Construction Schedule			39

Table 3 Changes Arising in Upstream Activities and Causing Reworks in Downstream Activities and its Category (Soliman, 2021)

Change No.	Changes of Predecessor Activities that Causing Reworks in Downstream Activities Due to Period Overlapping	Changes Category
F1	Incomplete Design at the time of tender.	Designer Related Changes
F2	Poor Coordination of design.	
F3	The design change is initiated due to financial and economic changes.	
F4	Omissions of activity or task from the contract documentation.	
F5	Errors made in the contract documentation.	
F6	Insufficient time to prepare contract documentation.	
F7	Inadequate client brief to prepare detailed contract documentation.	
F8	Ineffective use of information technologies.	
F9	The contractor instructed to modify a design	Contractor Related Changes
F10	The contractor instruction to modify construction methods	
F11	Non-compliance with the specification.	
F12	Machine breakdown and defects	
F13	Poor planning and coordination of resources.	
F14	Omission errors some activity or task by construction personnel.	
F15	The unqualified workforce in the project	
F16	Lack of training and experience.	
F17	Lack of coordination and poor communication.	Owner Related Changes
F18	The owner instructed to modify a design	

F19	Lack of experience and knowledge of the design and construction process.	
F20	Lack of funding allocated for site investigations.	
F21	Lack of client involvement in the project.	
F22	Insufficient time and money spent on the briefing process.	
F23	Lack of Expenditure for preparing contract documentation	

3.1 Sample Size

According to Easterby-Smith et al. (2002) [1] which were using Eq. (1) to compute the required sample size for unlimited population:

$$n = \frac{2500}{E^2} \quad (1)$$

Where,

n: is the required sample size for infinite population,

E: is acceptable standard error is less than 5% which used as percent.

3.2 Data Analysis

One hundred and thirty questionnaires (see appendix) were administered to professionals and experts in different construction projects. A total of one hundred questionnaires representing 76.92% of the total questionnaires administered were returned. Table 4 shows details of questionnaires administered and the rate of return. The respondents' job titles were classified into three categories in construction projects. The first category from a designer point of view owner represented 73.23 %, the second category from a contractor point of view (cost estimators, civil engineers, and project managers) represented 87.33.% and the third category from an owner point of view represented 77.5 %. Figure 1 illustrates the number of each category. The respondents to the questionnaire were classified according to their experience in Table 5 and Figure 2. A closer inspection to Figure 2 clearly shows that about 14% of the respondents have experience Less than 10 years, around 48 % have experienced greater than or equals to 10 years and less than 20, around 30 % have experienced greater than or equal 20 years and less than 30 and finally, 8 % of respondents have experienced greater than or equals to 30 years

Table 4 Details of Questionnaires Administered and the Rate of Return (Soliman, 2021)

Professionals and Experts	No. of Questionnaires	No. of Questionnaires Returned	% Returned Rate
Designer	30	22	73.23 %
Contractor	60	47	87.33 %
Owner	40	31	77.5 %
Total	130	100	76.92 %

Figure 1 Classification of Respondents Based on Their Job Title Category

Table 5 Classification of the Surveyed Experts Based on Their Experience

Experience Practicing	Owner	Contractor	Designer	Total %
Less than 10 years	6	6	2	14
Greater than or Equals to 10 years and Less than 20	10	21	17	48
Greater than or Equal 20 years and Less than 30	4	15	11	30
Greater than or Equals to 30 years	2	5	1	8
Total	22	47	31	100

Figure 2 Classification of the Surveyed Experts Based on Their Experience (Soliman, 2021)

3.3 Top Effective Upstream Changes

The respondents have inserted two scores in front of each factor in each percentage degree of overlapping between activities. First, the degree of impact of each factor causing reworks in

downstream activities. Second, the probability of occurrence of Rework for each factor on downstream activities, then calculate importance index for the previously identified twenty-three changes, finally, all changes are ranked in descending order according to their importance index according to Eq.2, Eq.3 Eq.4 and Eq.5.

$$\text{Total Score of Rework Frequency} = \sum_{i=1}^n (Fr) \quad 2$$

$$\text{Total Score of Severity} = \sum_{i=1}^n (SI) \quad 3$$

$$\text{Rework Frequency Index } (F_I) = \frac{\text{Total Score Rework Frequency}}{\text{No. of Respondents } (N) \times 10} \quad 4$$

$$\text{Severity Index } (S_R) = \frac{\text{Total Score of Severity}}{\text{No. of Respondents } (N) \times 10} \quad 5$$

$$\text{Importance Index} = (F_I) * (S_I) * 100 \quad 6$$

Where:

N: is the total number of respondents to each factor, (N=100)

10: represented the upper scale of the measurement.

The analysis also shows that the weight of all categories. Where (Owner changes) represented 25.80% followed by (Contractor changes) represented 41.93% and finally (Designer changes) represented 32.25% as shown in Figure 3.

Figure 3 Categories of the Changes that Causing Reworks in Downstream Activities (Soliman, 2021)

4. RESULTS

Based on the analysis and review of the construction industry surveyed experts' opinion and according to Pareto Principle, which states that 80 percent of the changes come from 20 percent of the causes, to select a certain number of changes which represent all changes and also these changes are the changes with the highest importance indexes. The minimum number of changes

considerable according to Pareto = $20\% * 24 \approx 5$ changes. The top eight changes and their importance indices are as follows: Lack of Coordination and Poor Communication were ranked in the first position with an (R.II) 33.87 % as the most important cause downstream reworks. The contractor instruction to modify a design was ranked in the second position with an (R.II) 25.65 %. Non-compliance with specification was ranked in the third position with an (R.II) 23.84 %. The owner instruction to modify a design is in the fourth position with an (R.II) 21.66 %. Incomplete Design at The time of Tender was ranked in the fifth position with an (R.II) 21.58 %. Poor planning and coordination of Resources in the sixth position with an (R.II) 21.20 %. Errors made in the contract documentation in the seventh position with an (R.II) 20.94 %. Lack of experience and knowledge of the design and construction process in the eighth position with an (R.II) 20.72 % as shown in Figure 4

Figure 4 Top Important Eight Changes That Causing Reworks in Downstream Activities (Soliman, 2021)

All changes have been ranked according to their important index as shown in Table 6. Also, the result showed that instead of eight changes, two changes were only considered under designer changes. Also instead of nine changes, three changes were only considered under contractor changes. Finally, it demonstrates that the weight of designer changes, contractor changes, and changes related to owner changes are 25 %, 37.5 %, and 37.5 % respectively as shown in Table 7.

Table 6 Changes Causing Rework in Downstream Activities Before and After Ranking, (Soliman, 2021)

Change Category	All Changes Before Ranking		Changes After Ranking	
	Sum	Weight	Sum	Weight
Designer	8	33.23 %	2	25 %
Contractor	9	37.5 %	3	37.5 %
Owner	7	29.17 %	3	37.5%
Total	<u>24</u>	<u>100 %</u>	<u>8</u>	<u>100 %</u>

Construction Factors That Causing Reworks in Downstream Activities Due to Overlapping

Table 7 The calculated important index for all changes causing Reworks in Downstream Activities

Factor No.	Changes Causing Rework in Downstream Activities	Category	R1 R2 → R100						Total Responses (N)	Total Score of Severity	Severity Index	Total Score of Frequency	Frequency Index	Important Index %	Rank
			S	F	S	F	S	F							
F1	Incomplete Design at The time of Tender	Designer	4	6	3	3	8	4	100	486	0.486	444	0.444	21.58	5
F2	Poor Coordination of Design		3	1	3	3	4	6	100	429	0.429	363	0.363	15.57	20
F3	Design change is initiated due to financial and economic changes		5	2	3	4	3	9	100	442	0.442	345	0.345	15.25	21
F4	Omissions of activity or task from the contract documentation.		2	4	4	4	9	1	100	396	0.396	448	0.448	17.74	11
F5	Errors made in the contract documentation		7	3	7	4	4	7	100	517	0.517	405	0.405	20.94	7
F6	Insufficient Time to Prepare Contract Documentation		4	4	3	4	4	1	100	377	0.377	425	0.425	16.02	17
F7	Inadequate Client Brief to Prepare Detailed Contract Documentation		4	3	2	2	3	6	100	381	0.381	341	0.341	12.99	24
F8	Ineffective Use of Information Technologies		3	3	9	6	4	9	100	447	0.447	420	0.42	18.77	9
F9	Design Change is Initiated by The Contractor	Contractor	2	3	7	5	6	9	100	579	0.579	443	0.443	25.65	2
F10	Change in construction methods in order to improve construct-ability or due to site conditions		3	4	9	9	4	4	100	454	0.454	380	0.38	17.25	14
F11	Non-compliance with Specification		6	1	6	9	4	5	100	515	0.515	463	0.463	23.84	3
F12	Machine not working satisfactorily or breakdown or defects		2	5		4	6	4	100	452	0.452	370	0.37	16.72	15
F13	Omission errors some activity or task by construction personnel		3	6	5	4	7	4	100	491	0.491	352	0.352	17.28	13
F14	Poor planning and coordination of Resources		2	1	6	4	1	1	100	576	0.576	368	0.368	21.1968	6
F15	Shortage or low skilled of labour		3	4	7	5	9	7	100	462	0.462	396	0.396	18.30	10
F16	Lack of training and experience		4	5	6	6	2	9	100	428	0.428	386	0.386	16.52	16
F17	Lack of Coordination and Poor Communication	Owner	2	4	2	4	8	3	100	659	0.659	514	0.514	33.87	1
F18	Design change is initiated by the owner		6	7	3	4	4	2	100	517	0.517	419	0.419	21.66	4
F19	Lack of experience and knowledge of the design and construction process		6	3	7	10	3	4	100	497	0.497	417	0.417	20.72	8
F20	Lack of funding allocated for site investigations		4	2	8	7	7	6	100	441	0.441	401	0.401	17.68	12
F21	Lack of client involvement in the project		6	3	5	0	1	3	100	432	0.432	366	0.366	15.81	18
F22	Insufficient time and money spent on the briefing process		2	3	4	4	2	3	100	355	0.355	367	0.367	13.03	23
F23	Expenditure on low fees for preparing contract documentation		2	3	7	4	3	4	100	411	0.411	357	0.357	14.67	22

Table 8 Rank of All changes and Highlights the Most Important Eight Changes

Rank	Change No.	Changes Causing Reworks of Construction Downstream Activities	Changes Category	Total Score of Severity	Severity Index	Total Score of Frequency	Frequency Index	Important Index %	Weight
1	F18	Lack of Coordination and Poor Communication	Owner	659	0.659	514	0.514	33.87	100.00
2	F9	Design Change is Initiated by The Contractor	Contractor	579	0.579	443	0.443	25.65	75.73
3	F11	Non-compliance with Specification	Contractor	515	0.515	463	0.463	23.84	70.40
4	F19	The design change is initiated by the owner	Owner	517	0.517	419	0.419	21.66	63.96
5	F1	Incomplete Design at The time of Tender	Designer	486	0.486	444	0.444	21.58	63.71

6	F14	Poor planning and coordination of Resources	Contractor	576	0.576	368	0.368	21.20	62.58
7	F5	Errors made in the contract documentation	Designer	517	0.517	405	0.405	20.94	61.82
8	F20	Lack of experience and knowledge of the design and construction process	Owner	497	0.497	417	0.417	20.72	61.19
9	F8	Ineffective Use of Information Technologies	Designer	447	0.447	420	0.42	18.77	55.43
10	F15	Shortage or low skilled of labor	Contractor	462	0.462	396	0.396	18.30	54.02
11	F4	Omissions of activity or task from the contract documentation	Designer	396	0.396	448	0.448	17.74	52.38
12	F13	Omission errors some activity or task by construction personnel	Contractor	491	0.491	352	0.352	17.28	51.03
13	F10	Change in construction methods to improve construct-ability or due to site conditions	Contractor	454	0.454	380	0.38	17.25	50.94
14	F12	Machine not working satisfactorily or breakdown or defects	Contractor	452	0.452	370	0.37	16.72	49.38
15	F16	Lack of training and experience	Contractor	428	0.428	386	0.386	16.52	48.78
16	F6	Insufficient Time to Prepare Contract Documentation	Contractor	377	0.377	425	0.425	16.02	47.31
17	F22	Lack of client involvement in the project	Owner	432	0.432	366	0.366	15.81	46.68
18	F17	Problems associated with multi-layered subcontracting	Contractor	383	0.383	408	0.408	15.63	46.14
19	F2	Poor Coordination of Design	Designer Related Problems	429	0.429	363	0.363	15.57	45.98
20	F3	The design change is initiated due to financial and economic changes	Designer	442	0.442	345	0.345	15.25	45.02
21	F24	Expenditure on low fees for preparing contract documentation	Owner	411	0.411	357	0.357	14.67	43.32
22	F23	Insufficient time and money spent on the briefing process	Owner	355	0.355	367	0.367	13.03	38.47
23	F7	Inadequate Client Brief to Prepare Detailed Contract Documentation	Designer	381	0.381	341	0.341	12.99	38.36

5. CONCLUSIONS

Based on a survey among the different construction experts in Egypt, the most important factors affecting cost contingency were: Importance Index (Relative significance index scores) were developed for the factors identified to be affecting the time rework contingency estimation. According to these Importance Index, the most eight effective factors affecting the estimation of cost contingencies are

- Lack of coordination and poor communication,
- The contractor instruction to modify a design,

- Non-compliance with the specification,
- The owner instruction to modify a design,
- Incomplete design at the time of tender,
- Poor planning and coordination of resources,
- Errors made in the contract documentation and
- Lack of experience and knowledge of the design and construction process.

It is recommended to avoid the disputable claims the following:

- Owners need to effectively manifest their needs and requirements before designs are conducted.
- The need for training of construction Stakeholders on construction rework and other Variables that causes Projects to overshoot The Budget, time and another resource. Consultants need to give special care to the review and approval of shop drawings.
- Make sure that everyone understands the contractual notice provision.
- Owners, contractors, designers, etc. must be aware of the notice provision in the contract document.
- Recognize that a "risk-sharing" philosophy will probably produce the lowest overall project cost for the owner and maximum profit to the Contractor

DECLARATION

This paper is based on Ph.D. prepared by the third author (corresponding author) and under the supervision of the first two authors.

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APPENDIX

Questionnaire Survey

In this survey, the factors that arising in the upstream Activities and Causing Reworks in the downstream Activities are categorized into three main categories as follow:

- The Owner Related Changes.
- The Designer Related Changes.
- The Contractor Related Changes.

The rework time values are allocated to each factor depending on the degree of overlapping between each pair of activities. The degree of overlapping (duration of overlapping) will be a percentage of the smallest duration of the upstream and downstream activities.

Note

Please give a rank number for each factor to reflect its significance, Time as Frequency, where 0 indicates lack of factor's Frequency and from 1 to 10 indicates no. of Frequency for each factor, Time as factor Severity, where 0 indicates lack of factor and from 1 to 10 indicates to the value of factor Severity

Questionnaire Survey Design

Factor No.	Changes of Predecessor Activities that Causing Reworks in Downstream Activities Due to Period Overlapping	Problem Category	Severity on Causing Rework in Downstream Activities (0 To 10)	The Probability of Occurrence of Rework (0 To 10)
F1	Incomplete Design at the time of tender.	Designer Related Changes		
F2	Poor Coordination of design.			
F3	Design change is initiated due to financial and economic changes.			
F4	Omissions of activity or task from the contract documentation.			
F5	Errors made in the contract documentation.			
F6	Insufficient time to prepare contract documentation.			
F7	Inadequate client brief to prepare detailed contract documentation.			
F8	Ineffective use of information technologies.			
F9	The contractor instruction to modify a design	Contractor Related Changes		
F10	The contractor instruction to modify a construction methods			
F11	Non-compliance with specification.			
F12	The contractor instruction to modify a construction methods			
F13	Machine breakdown and defects			
F14	Poor planning and coordination of resources.			
F15	Omission errors some activity or task by construction personnel.			
F16	Unqualified work force in the project			
F17	Lack of training and experience.			
F18	Lack of coordination and poor communication.	Owner Related Changes		
F19	The owner instruction to modify a design			
F20	Lack of experience and knowledge of the design and construction process.			
F21	Lack of funding allocated for site investigations.			
F22	Lack of client involvement in the project.			
F23	Insufficient time and money spent on the briefing process.			