

Chapter (3)

3.1 Previous studies:-

By tracking and research in books and the Internet in order to reach studies similar to this study i found several studies ,mention them briefly, these studies salary from oldest to newest.

3.1 Researcher: Syed M. Ahmed, Ph.D., M.ASCE (2002)

Entitled : Construction delays in Florida:

Projects in the Florida construction industry through a survey studies to determine the causes of delays in construction projects have been carried out in the US.

The main objective of this study is to identify the major causes of delays in construction projects in the Florida construction industry through a survey. The primary aim is to identify the perceptions of the different parties regarding causes of delays, the allocation of responsibilities and the types of delays.

Data were gathered through a questionnaire. The questionnaire survey was made available on the Internet .

The questionnaire was prepared and sent to the different companies especially general contractors in the state of Florida by regular mail and also via Internet.

The researcher divided causes of delays in construction projects to two kinds: external and internal causes. Internal causes of delays include the causes, which come from four parties involved in that project. These parties include the owner, designers, contractors, and consultants. Other delays, which do not come from these four parties, are based on external causes for instance from the government, material suppliers, or weather.

The researcher found :

Based on the results of the questionnaire survey and information gathered from the literature review, the researcher found:

Generally, whether a delay is determined to be excusable or non-excusable.

Basic structure of the flow diagram as it relates to delays:

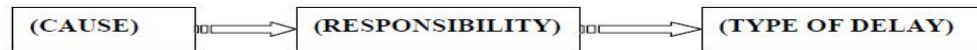


Figure: 3.1 Case of delay , responsibility and type of delay

Acts of God:

In the event a delay occurs due to acts of god, the responsibility is borne by the Owner and the type of delay is an excusable compensable.

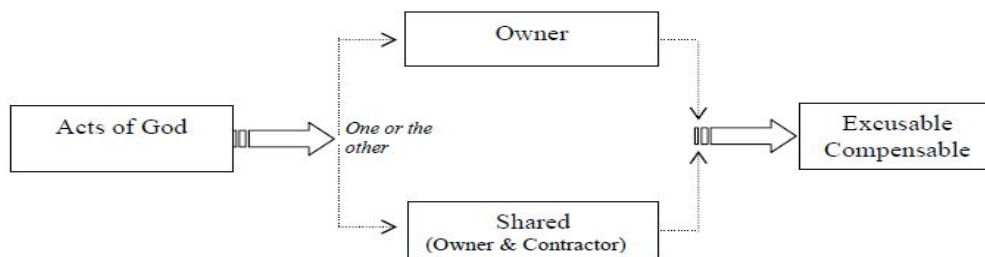


Figure: 3.2 Delay occur due act of god

Design Related:

This is one of the most critical categories among the six because all of the causes were identified as key delays, which means that a delay is most likely to happen due to a design related problem.

According to the survey, design-related Delays are considered as excusable compensable delays.

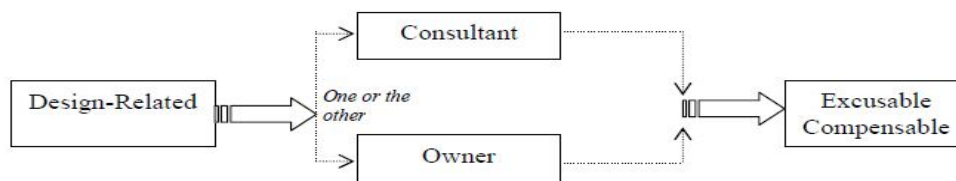


Figure: 3.3 Delay occur due design related

Construction Related:

Basically in construction stage, the contractor will always have the responsibility and the construction company will get no time or money if a delay occurs. However, if a delay occurs because of subsurface soil conditions or different site conditions, the responsibility would be shared between the contractor and the owner and the type of delay in this situation would be considered excusable compensable.

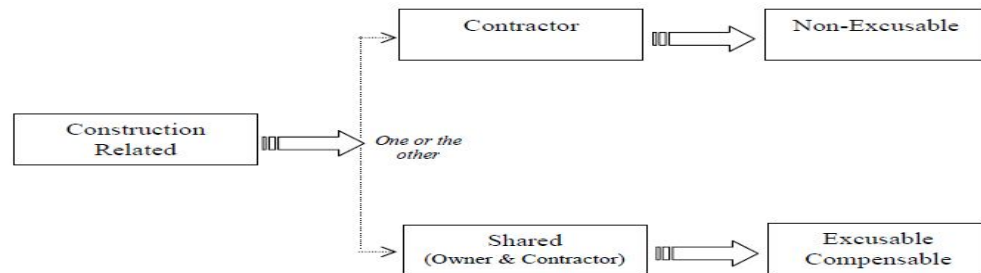


Figure: 3.4 Delay occur due construction related

Financial/Economical:

According to the results, it seems that delays rarely occur because of financial/economical reasons. The owner of the project will always have the responsibility, which means that the delay will be excusable compensable.

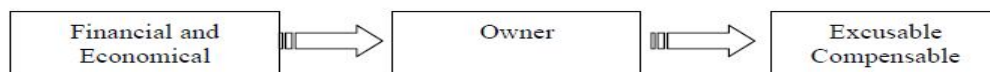


Figure: 3.5 Delay occur due financial related

Management/Administrative:

Similar to the above category (financial/economical), However there are two parties involved (owner and contractor) that have to carry the responsibility depending on the cause of the delay and the type of delay is also depending on what caused the delay.

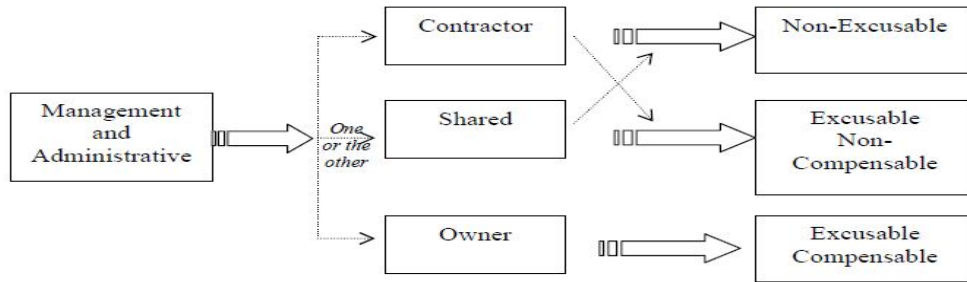


Figure: 3.6 Delay occur due management related

Code Related:

This is the category that influences the most in delays, especially on projects built on the coastal areas. Very often (77.7%), the government is responsible for it and in this case they are excusable compensable delays. However, there is a chance of 22.3% that the contractor be responsible for it in which the delays are con-Compensable.

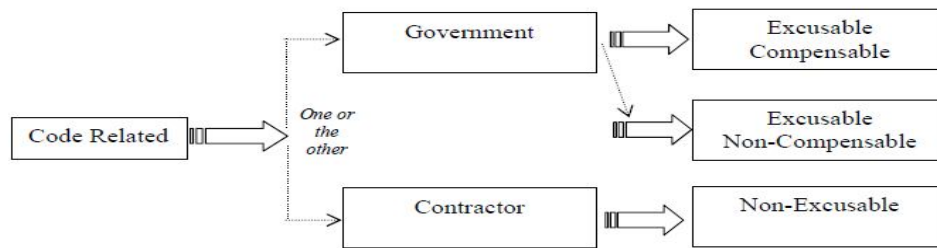


Figure: 3.7 Delay occur due code related

- Code-related delay is ranked as the most critical category followed by design-related delays, construction-related delays, and so on, as shown below:

- 1-Code-related delays .
- 2-Design-related delays .
- 3-Construction-related delays .
- 4-Financial/ economical delays .
- 5-Management/administrative delays .
- 6-Acts of god .

In general, the ten (10) most critical causes (across the six sub-headings given above) of

delays are:

1. Building permits approval .
2. Change order .
3. Changes in drawings .
4. Incomplete documents .
5. Inspections .
6. Changes in specifications .
7. Decision during development stage .
8. Shop drawings approval .
9. Design development .
- 10.Changes laws - regulations .

- Based on the overall results the researcher found:

officials for the delay in accordance with the following table:

Table: 3.1 Responsibility of the delay in the Previous study Construction Delays in Florida:

Contractor	44%
Owner	24%
Government	14%
Shared	12%
Consultant	6%

The researcher found that the most common type of delay accordance with the following table: at, followed by delays with and for excusable non-compensable delays.

Table: 3.2 Type of delay in the Previous study Construction Delays in Florida:

Excusable Compensable	48%
Non-Excusable	44%
Excusable Non-Compensable	8%

Based on the findings of this research, the researcher would like to recommend that the buildings permit approval process be streamlined as much as possible and changes in laws and regulations be made keeping in mind the negative impact it causes in terms of construction project cost and time. Design related issues such as changes in drawings incomplete and faulty specifications and change orders have a very damaging effect on project completion times and invariably lead to cost escalations as well .

3.2 researcher :Sadi A. Assaf and Sadiq Al-Hejji (2005)

Entitled : Causes of delay in large construction projects:

The main objectives of this study include the following:

- To identify the causes of delays in construction in eastern province of Saudi Arabia.
- To test the importance of the causes of delay between each two groups of parties.
- To study the differences in perceptions of the three major parties in any constructions, namely, owners, contractors and consultants.

Data were gathered through a questionnaire. The questionnaire is divided into two main parts. Part I is related to general information for both the company and respondent.

Both contractors and consultants were further requested to answer questions pertaining to their experience in the construction industry and their opinions about the percentage average time delay in projects they experienced .

Part II includes the list of the identified causes of delay in construction project. These causes are classified into nine (9) groups according to the sources of delay: Factors related to project, owner, contractor, consultant,

design-team, materials, equipment, manpower (labor), and external factors.

For each cause/factor two questions were asked: What is the frequency of occurrence for this cause? And what is the degree of severity of this cause on project delay? Both frequency of occurrence and severity were categorized on a four-point scale. Frequency of occurrence is categorized as follows:

Always, often, sometimes and rarely (on 4 to 1 point scale). Similarly, degree of severity was categorized as follows: extreme, great, moderate and little (on 4 to 1 point scale).

Respondents included 23 contractors, 19 consultants and 15 owners out of 66, 51 and 27 distributed questionnaires respectively. The contractors surveyed are categorized as grade 2 or above. They have an average of experience of about 23 years, while, participated consultants have an average of about 21 years of experience. Simple random sampling was used to select the participants from an available list.

About 76% of the participating contractors specified indicated that the average time overrun for the projects they have experienced is between 10% and 30% of the original project duration. About 56% of the participated consultants specified the same percentage. About 25% of This study covers both private and public projects and has been chosen to be just or almost completed. Owners who have experience with more than one project are surveyed. The participated owners included government departments. Saudi aramco, Saudi electricity company, eastern branch, girls college, Al-Yaum daily newspaper, and others.

Table shows the most important causes of delay according to the owners, contractors and consultants. Only one cause of delay is common between all parties, which is ‘‘change orders by owner during construction’’. There are many causes which are common between two

parties, such as delay in progress payments by owner, ineffective planning and scheduling of project by contractor, poor site management and supervision by contractor, shortage of labors and difficulties in financing project by contractor.

All three parties agree that the following delay causes are the least important:

- 7 Changes in government regulations and laws.
- 7 Traffic control and restrictions at job site.
- 7 Effect of social and cultural factors.
- 7 Accidents during construction.

Table: .3 The most important causes of delay in the previous study causes in large construction projects:

Importance of delay causes			
S. no.	Owners	Contractors	Consultants
1	Shortage of labors	Delay in progress payments by owner	Type of project bidding and award
2	Unqualified work force	Late in reviewing and approving design documents by owner	Shortage of labors
3	Ineffective planning and scheduling of project by contractor	Change orders by owner during construction	Delay in progress payments by owner
4	Low productivity level of labors	Delays in producing design documents	Ineffective planning and scheduling of project by contractor
5	Hot weather effect on construction activities	Late in reviewing and approving design documents by consultant	Change orders by owner during construction
6	Conflicts encountered with sub-contractors' schedule in project execution	Difficulties in financing project by contractor	Low productivity level of labors
7	Poor site management and supervision by contractor	Mistakes and discrepancies in design documents	Difficulties in financing project by contractor
8	Inadequate contractor's experience	Late procurement of materials	Poor site management and supervision by contractor
9	Effects of subsurface conditions (soil, existing of utilities, high water table, etc)	Inflexibility (rigidity) of consultant	Poor qualification of the contractor's technical staff
10	Change orders by owner during construction	Slowness in decision making process by owner	Delay in material delivery

The researcher found :

The delay in construction projects in Saudi Arabia is discussed in a field survey. It studied frequency, severity and importance of the causes of delay. The importance index of each cause is calculated as a product of both frequency and severity indices of each cause. 73 causes of delay were identified through research. The identified causes are combined into

nine groups. The field survey included 23 contractors, 19 consultants, and 15 owners.

Data collected were analyzed by frequency, severity and importance. 76% of the contractors have indicated that average of time overrun is between 10% and 30% of original duration, while about 56% of the consultants specified the same percentage.

25% of the consultants have indicated from 30% to 50% average time overrun. Owners specified that causes of delay are related to contractor and labors. Study indicated that owners and consultants realize that awarding to the lowest bidder is the highest frequent factor of delay, while, contractors considered severe causes of delay are related to owners.

The researcher recommended :

The following points can be recommended by all parties in order to minimize and control delays in construction projects:

Owners should give special attention to the following factors:

- _ Pay progress payment to the contractor on time because it impairs the contractors ability to finance the work.
- _ Minimize change orders during construction to avoid delays.
- _ Avoid delay in reviewing and approving of design documents than the anticipated.
- _ Check for resources and capabilities, before awarding the contract to the lowest bidder.

Contractors should consider the following factors:

- _ Shortage and low productivity of labor: enough number of labors should be assigned and be motivated to improve productivity.
- _ Financial and cash flow problems: contractor should manage his financial resources and plan cash flow by utilizing progress payment.

_ Planning and scheduling: they are continuing processes during construction and match with the resources and time to develop the work to avoid cost overrun and disputes.

_ Site management and supervision: administrative and technical staff should be assigned as soon as project is awarded to make arrangements to achieve completion within specified time with the required quality, and estimated cost.

3.3 Researcher: Wa’el Alaghbari, Mohd. Razali A. Kadir, Azizah Salim and Ernawati (2007)

Entitled : The significant factors causing delay of building construction projects in Malaysia:

The research seeks to identify the major factors causing delay in building construction projects in Malaysia .

The data for this study was gathered through a detailed questionnaire survey.

Questionnaire survey was used to carry out the study. The questionnaire consisted of 31 factors which were grouped into four major categories by responsibility :

1-contractor factors.

2-owner factors.

3-consultant factors.

4-and external factors.

The level of importance of the categories was measured and the relative importance of weights was ranked.

The study found that financial problems are the main factor and coordination problems are the second most important factor causing delay

in construction projects in Malaysia. The results were analyzed to rank the causes of delay and further classify the types of delay.

Problems are considered the second important factor causing delay in construction projects, followed by materials problems.

Further examination of factors causing delay in construction projects in Malaysia based on four categories

1-contractor.

2-consultant.

3-owner.

4-external

factor

The researcher found construction projects delay, grouped into four categories by responsibility:

Table: 3.4 Responsibility of delay in the Previous study Causes The significant factors causing delay of building construction projects in Malaysia

terms of responsibility for delays	responsible
1	contractors
2	Consultants
3	owners
4	external factors

The researcher arranged the reasons for the delay, according to the responsibility of the contractor and the consultant and the owner and external factors:

Table: 3.5 Arranged of responsibility of delay in the Previous study Causes The significant factors causing delay of building construction projects in Malaysia

contractors	consultants	Owners	external factors
1-Financial problems	1-Financial problems (delayed payments, financial difficulties, and economic problems)	1-Supervision too late and slowness in making decisions	1-Lack of materials on the market
2-Shortage of materials on site	2-Slowness in making decisions	2-Slow to give instructions	2-Poor site conditions (location, ground, etc.)
3-Poor site management	3-Contract modifications (replace and add new works to the project; change in specifications)	3-Lack of consultant's experience	3-Lack of equipment and tools on the market
4-Construction mistakes and defective work	4-Lack of coordination with contractor	4-Incomplete documents	4-Poor weather conditions
5-Delay in delivery of materials to site	5-Lack of working knowledge	5-Lack of consultant's site staff experience (managerial and supervisory personnel)	5-Transportation delays
6-Coordination problems with others		6-Absence of consultant's site staff	6-External work due to public agencies (roads, utilities, public services)
7-Shortage of site labour			7-Poor economic conditions (currency, inflation rate, etc.)
8-Low labour productivity			8-Changes in laws and regulations
9-Poor skills and experience of labour			
10-Lack of subcontractor's skills			
11-Lack of site contractor's staff			
12-Equipment and tool shortages on site			

The study shows that on the contractor's side, financial problems are the major factor in delaying construction projects. Poor site management

and, as a consequence, construction mistakes, delay in the delivery of materials to the site, and coordination. Problem were the subsequent factors causing delay in construction projects in Malaysia. The next most important factors causing delay in construction projects in Malaysia come from the labour side, and finally the contractor's side, summarized by lack of subcontractor's skills" and "lack of site contractor's staff."

This study also shows that the main factor on the owner's side causing delay in construction projects is financial problems. The management ability of the project's owner is the second important factor causing delay in construction projects.

From the consultant's side, the first component that seems to be the cause of delay in construction projects is ineffective or lack of supervision, followed by "slowness in giving instructions" and "lack of consultant's experience". Weakness in consultant management is the next most important factor that causes delay in construction projects. Finally, the most important external factor causing delay in construction projects is lack of materials and lack equipment and tools. The next most important factor is poor site conditions (location, ground, etc.), followed by a lack of equipment and tools on the market, poor weather conditions and transportation delays .

Based on the findings and discussions of this research, it is recommended that financial support and technical support are a very necessary and urgent step for construction investments, since the results of the analysis show that financial problems are the major factor causing delay in construction projects. Technical support is also necessary since the study shows that coordination problems are the second major factor causing delays in construction projects in Malaysia .

3.4 Hussein Ali Awad and inattentive Karim al-Hindawi (2007)

Entitled : Causes of Delay in Iraq Construction Projects:

The research main objectives and other associated secondary, as follows:

- 1 - numbers order of priority for the reasons for the delay rate for an Occurrence and importance importance .
- 2 - determine the relevance of each of the different groups in the project team (the contractor and the employer and the supervising engineer) the reasons for the order and priority.
- 3 - explore the extent to which the different groups in the project team (the contractor and the employer and the supervising engineer) in connection with the order of the reasons for the delay in order of priority.
- 4 - explore the relationship between the average delay rate and the number of years of experience among the respondents.

Data were gathered through a questionnaire.

The researcher found :

The classification of the main factors causing the delay in the form of four statistical category items are contractor-related factors and factors related to the employer and factors related to the official rules and regulations and external factors related reasons and found to be arranged as follows:

Table: 3.6 The classification of the main factors causing the delay in the previous study in construction projects:

1	Owner
2	Contractor
3	Official rules and regulations
4	External factors

He is also found :

That the most important reasons for project delays common occurrence and severely affecting sequence is:

1. Delayed the necessary laboratory tests of materials, referral business for less bids in state enterprises, inefficient financial contractor, abnormal rise in the prices of materials, a contractor for the miscalculation time of the implementation of the project
2. That employer-related factors are the most important factors causing the delay followed by contractor-related factors.
3. 24%, 36% of the change in the proportion of delays in the contractor and supervising engineer respectively in terms of his experience in the implementation of projects that can be described in relation exponential ((S-curve. that the rest of the ratio of the change in the proportion of delay explained by variables other independent and it supports naming other reasons for the delay in construction projects.

The researcher recommended :

1. Facilitate laboratory testing procedures for construction and materials Created with adequate testing laboratories and adopt field laboratories mechanism for large projects.
2. Reconsider the referral projects on the basis of lower prices and the adoption of technical and financial efficiency, past experience and balance the prices submitted and the time required for implementation.
3. Audit contractor's financial efficiency and its ability to project implementation before transmitting.
4. Provide adequate reserve amounts for each project to cover expenses resulting from the price change and height.
5. Setting the agenda offers a realistic work according to scientific formulas depending on the productivity of labor or previous experience.
6. Facilitate the procedure for payment of amounts owed to contractors.
7. Ensure the availability of adequate financial allocation for the project

before the announcement or referral.

8. Computer use in documenting and following up the implementation of projects and quality control to take advantage of the feedback (Feedback) in future projects.

9. Researcher recommends conducting studies and research to identify labor productivity for all events in construction projects to be used in determining the duration of the project.

10. Researcher recommends a detailed study of the records of completed projects late and see the relationship between the factors causing the delay in these projects.

3.5 researcher : Maher Mustafa, Riaz Hussain (2010) :

Entitled : Reasons for delay construction projects in Syria

The primary objective of this research in identifying the key elements to delay projects construction and its importance Survey was conducted for the performance of projects Syrian construction through methodology based method to questionnaire to determine the reasons for the delay the select seventy reason for delay classified into eleven categories. The study found the most important reasons for the delay are:-

Table: 3.7 The classification of the main factors causing the delay in the previous study causes of delay in Iraq construction Projects:

1	difficulties in financing of projects by the Contractor.
2	Delays in delivery of the project site free obstacles.
3	the dispute between the contractor and supervision and owner.
4	Errors and inconsistencies in the documents design
5	non-qualified labor
6	labor shortages
7	delays in the contracting process and supply of building materials