EFFECT OF CRITICAL DELAY FACTORS ON COST – OVERRUN DURING THE DESIGN STAGE

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As known the design stage in the project life cycle requires good management, continuous improvement, and new technologies and resources. In Libya most of the local and international bureaus have failed to meet its obligation and satisfy their clients needs . The aim of this paper is to identify the critical factors and variables that influence the delay and investigate it's effect on cost - overrun in construction projects during the design stage, noting that these factors might be caused by the consultant bureaus or clients or third parties. The initial results of this research suggests that the majority of delay factors comes from the owners, in which the administrative procedures, legal requirement, financial tightness are the main concern and they play the major role in cost-overrun.

Keywords: Delay factors, Deign stage, Owner, Consultant, Third party

INTRODUCTION

Construction projects delivered through different stages during its life cycle starting with planning for the future demands stage, looking for sponsoring resources, suggesting alternatives and feasibility studies followed by design stage which includes preparation of engineering maps, specifications and tendering documents, ending with construction, implementation and maintenance stage (Smith 1995).

To achieve the client objectives in terms of time, cost and quality, construction projects needs resources, skills and good management through these stages and a high level of commitment and cooperation among all who are concerned. I.e. owners, engineers, and contractors to achieve the targets and satisfy the end user (Moder 1993).

Past researches and practical evidence in many local projects had seen a remarkable delay and cost over runs. Many researchers have focused on the delay in the construction stage (Abounahia,1998), (Krima, , Auoad, Hatush, Baldry, 2005), but we believe that studying the delay and its impact during the design stage is so important and contributed largely on the overall delay during the whole life cycle time and overall project cost-overrun (Hatush, Samira 2004).

The design stage needs qualified technical experts (Hauscshildt, 2000), a systematic approach, well-designed organization, (Berggren, 2001), continues improvement process, new technologies and resources (Oakland 2003). In this era, delivery and value of time are considered as one of the most success factors for the organization to withstand and compete.

In Libya as in many developing countries, most of the projects executed in the last thirty years have witnessed a delay; most of the local and international bureaus have

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failed to meet its obligation due to the huge size and complexity of works under taken**,** (Krima, 2001). Table 1 shows some projects in Libya had been faced with delay during the stage (GMMRWA reports)

The aim of this paper is to identify the critical factors and variables that influence the delay, then risk assessment model will be used to investigate the effect on cost - overrun in construction projects during the design stage.

PROJECT SUCCESS FACTORS

Decision makers always faced with the dilemma of making their project success, they and their managers have to plan for achieving the project objectives (Time – Cost – Quality).

A real understanding of the project specific objectives, anticipated risks, defining the responsibilities, studying the scope of work, time management, cost management, and legal requirements are among many factors that has to be carefully considered, and must be planned for during all stages of the project cycle.(Thomas 2001-2002)

To understand the management practice during the design stage in Libya, a field survey was conducted through a questionnaire survey to investigate the factors that cause delay.

QUESTIONNAIRE OBJECTIVES

The Questionnaire will focus on:

Finding the main reasons for the problem of delay during the design stage in the construction projects, which is well known by the decision makers and even by the supervision parties.

Clarification of the administrative and technical responsibilities between design engineers, design bureaus and the clients.

Determination of the most important factors causing those delays and its effects to help the decision makers to implement the necessary precautions in the suitable time.

Create a sense of the importance of this problem among all the concerned parties including design engineers, owners, researchers and academicians in order to give a chance to seek a deep investigation to the problem through the proposed and recommendations of the paper.

Table 1: Delays and cost-overrun of some projects in Libya

Name of project	Contract value (L.D)	Contract Duration(month)	Overrun cost (L.D)	Delay time(month)	Causes of Delay
Engineering study and design of supply and distribution network for 266 farms	400,000.000 1L.D=2.4$	10	55,000	31	• Continuous change in the requirements and project philosophy. • Long and complicated chain of procedures and decision making process. • Compulsory economic plans and programs from the top government.
Engineering study and design of supply and distribution network for 500 farm	333,800.000 1L.D=2.115 $	8	5% Demurrage	12	• Delay in procedures of opening letter of credits, advance and progress payments. • Obstacles and complicated procedures and problems with third parties.
Engineering study and design of supply and distribution network for 457 farm	470,250.000 1L.D=2.149 $	10	242,047.000	19	• Delay in procedures of opening letter of credits, advance and progress payments. • Continuous change in the requirements and project philosophy. • Obstacles and complicated procedures and problems with third parties
Preparing of engineering study, specification, Bill of quantity for main conveyance line and agriculture tanks	467,802.000 1L.D=2.05$	9	5% Demurrage	11	• The shortage in the preparation and their requirements of the scope of work. • Compulsory economic plans andprograms from the top government

QUESTIONNAIRE DESIGN AND SURVEY

The questionnaire is divided to five main parts as follows

Personal Data
such as the engineer graduation , field of experience, kind and size of projects that the person are involved as a designer or supervisor.

Information about the designer engineer
The aim of this part is to know the experience of the designer in studying and designing projects and his background in engineering management, and his experience in how to deal with delay.

Information about consultants
Delay may be occur not because of the deficiency of engineer but may occur because of the deficiency of consultant's bureaus such as the bad engineering process, lack in information, communication. So the aim of this part is to collect data about the level of engineering system, experience, all facilities to help and supporting designers to do their jobs.

The designer opinion
This part aims to know the opinion of the respondent from his view according to his experience about the importance of organization, communication, information, engineering management, the relationship between parties in the project to avoid delay.

Studying of delay factors
This part aims to know what are the critical delay factors that affect projects success in Libya and its impact on cost over-run.

This part is the main concern of this paper, where the respondents were asked about their opinion on the probability of occurrence of the delay factor, degree of prediction and the affect of on cost-overrun of the project for each delay factor that could be caused from either (owner or consultant or third party) in a scale from 1to 5.

Probability of occurrence					**Degree of prediction**					**Affect on cost**				
low				high	easy				difficult	Low				high
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

The result of multiplication of the three will give an index of the criticality of the delay factor. The highest score will be 125, which is considered the most critical.

Table2 shows the list of the delay factors, which were collected, from literatures,

Interviews and the practical experience of the researchers and the feedback from the

Pilot study conducted at the earlier stage of the survey.

Table 2. Delay factors caused by Consultant, Owner, and Third party.

Consultant	Owner	Third party
Unavailability of technical expertise's	The project is not properly per-planned	Social direction and guidance
Unavailability of new and developed software's and techniques for the design and reviews	The feasibility studies are not comprehensive	Compulsory economic plans and programs from the top government
Shortage in human and financial resources	The shortage in the preparation and the requirements of the scope of work	The numerous requirements of legal authorization and acceptances
Unavailability of quality management systems	Procurement system is not properly selected	Instability of Prices
The project definition and process are not preplanned	The technical expertise is not enough.	Instability in the exchange rate
Unsuitability of working conditions	Continuous change in the requirements and project philosophy	Absence of motivation and competitiveness
Complications of project design	Appointing an overloaded consultant for the job Presenting old and an updated data	Instability of project contractual regulation and laws
Unrealistic time estimates for the project	Instability and bad central administration	
The project risks are nor predefined, assessed and prepared for.	Long and complicated chain of procedures and decision making process	
Unserious and careless consultant	Slowness in the decision making action	
Weak organization chart	Delay in procedures of opening letter of credits, advance and progress payments	
Sub consultant are not properly selected	Obstacles and complicated procedures and problems with third parties	
Subcontracting works with more than one subcontractor	Clauses of the contract are not tied in case the consultant fails to fulfils his obligation	
Signing number of contacts more than the consultant capability	The duties and wrights of each party are not properly defined in the contract	
Instability and bad central administration	Unbalanced risk distribution between parties	
Long and complicated chain of procedures and decision making process	Allowance in the clauses of the contract in case of time and cost overruns	
Obstacles and complicated procedures and problems with third parties		
The relationship between the three parties is not well Invalidity of financial and required funding		
The duties and wrights of each party are not properly defined in the contract		

QUESTIONNAIRE ANALYSIS

Analysis will be limited to the results of the questionnaire for the criticality indexes of the delay factors.

Forty questionnaires were sent to different expertise from different consultant's offices and owners, only twenty-five has responded in which five of them were excluded from the analysis.

The criticality index for each delay factor was calculated for each individual respondent, then the average of the twenty respondents were calculated to identify the critical delay factor caused by the three parties

Critical factors caused by owner

The following are the top five delay factors and their criticality indices caused by the owner

Delay factor	Cr. Index	Rank
Delay in procedures of opening letter of credits, advance and progress payments	**79**	1
Instability and bad central administration	**66**	2
Obstacles and complicated procedures and problems with third parties	**63**	3
Continuous change in the requirements and project philosophy	**55**	4
Long and complicated chain of procedures and decision making process	**55**	5

Critical factors caused by consultant

The following are the top five delay factors and their criticality indices caused by the consultant

Delay factor	Cr. index	Rank
Sub consultant are not properly selected	**51**	1
Un availability of financial and required funding	**49**	2
Instability and bad central administration	**43**	3
Obstacles and complicated procedures and problems with third parties	**42**	4
Signing number of contacts more than the consultant capability	**41**	5

Critical factors caused by third party

The following are the top three delay factors and their criticality indices caused by the third party

Delay factor	Cr. index	Rank
Instability of Prices and exchange rates	**44**	1
Social direction and guidance	**43**	2
Compulsory economic plans and programs from the top government	**41**	3

It is clearly evidence that the owner has the major responsibility in the delaying of the projects during the design stage where the owner dominates the top ranked factors among the three parties.

CONCLUSION

The initial results of this research suggested that the majority of delay factors come under the shoulder of the owner, even though the other parties has a part of responsibility of the problem.

In Libya the results from this research have shown that the administrative procedures, legal requirement, financial tightness are the main concern (for all parties) and they play the major role in the delaying of the projects during the design Stage.

The worst situation is where the requirements of the project changed imprecisely during the progress of the work with out proper recognition of the new situation. Changes are a cave of catastrophic failure (project No3 in table 1), so the design philosophies should be frozen and changes should only be limited to the most controlled circumstances.

Consulting offices in Libya favour to sign contracts with sub consultants especially in large and complexity projects to prove the design. The problem with this arrangement on managing technical and interface tasks.

Indeed, political sponsorship is viewed as one of the most critical 'success' factors for projects .though political over- dominance generally reduces managerial efficiency, government must provide the conditions necessary for project success-Clear objectives allow flexibility of management approach, legal agreements should be clear and equitable, provide stability, commitment and continuity, they should reflect properly the parties, key objectives, financial provision, problems of sovereignty, taxation, rights and responsibilities (e.g. projects in table 1)

For the DECISION MAKERS and all parties who are concerned they are generally considered to assist in reducing cost growth, they require a reasonable degree of specification and not too high a level of technical uncertainty, where this is not the case their benefit can be questionable to act accordingly In keeping the projects ends successfully with its time target.

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