

## CAUSES FOR DELAYS IN CONSTRUCTION PROJECTS IN KUWAIT

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### ABSTRACT

The paper presents a study based on a research that analyzes and ranks the causes of delays in building and housing type projects undertaken by governmental agencies in Kuwait. The study was based on a survey with the parties involved in these governmental projects. A questionnaire containing 53 delay causes was distributed and the respondents were 23 governmental management and engineering personnel, 17 contractors and 8 designers representing A/E firms. The questions were prepared in which the causes were categorized into eight major groups: 1) client administration and organizational, 2) client's site supervision, 3) contractor related, 4) labor related 5) quality related, 6) design related, 7) project management, and 8) contractual related. The factors were measured and ranked under each group by the 'Relative Importance Index' for three parties. The results suggest that delays are attributed to poor project management factors and client's administration and site supervision practices. The paper presents recommendations for a better application of project management techniques and procedures being taken at both conceptual and detailed planning phases of projects.

**KEY WORDS:** Construction industry, Kuwait, project delays, Relative Importance Index

## **1. INTRODUCTION**

The construction industry is a major stimulant in Kuwait's economic growth as the government takes a major share in the construction activity. The government is involved in the following major sectors: electricity, telecommunications, transportation, water and wastewater, education and health, and finally buildings and housing. There are many public agencies overseeing the construction process on behalf of the government of Kuwait. Such agencies include Ministry of Public Works (MPW), National Housing Authority (NHA) and Ministry of Electricity and Water (MEW).

Both MPW and NHA are taking a leading role in building and housing projects. MPW is in charge of major governmental buildings and institutions that include buildings and schools, hospitals and other institutions. The building and housing projects that both MPW and NHA are overseeing are large. For example, some of these residential projects have an estimated budget of KD15 million (=US\$50 million). The annual allocated budget for building and housing projects is estimated at KD360 million (= US\$1,200 million). The design and construction are performed by local design and construction firms, respectively.

During the last decade, many of the building and residential projects have not finished on time. These delays, which are costly to the country, draw many complaints from the people benefiting from the projects. According to the NHA records, it is estimated that a family has to wait for a period of 14 years to receive a particular housing unit. Thus, there is a need for the construction industry to find ways to be more efficient.

The paper is a result of a questionnaire conducted by Kuwait University as a part of a research project exploring the cases of delays in construction projects in Kuwait. The major thrust of this survey was to investigate the current views of construction industry participants as to the causes of time overruns of local projects. The selected participants were client representatives, contractors and architectural/engineering (A/E) firms. There was a need to conduct this research, as there was a lack of data, references and studies that investigate the causes of delays in Kuwait. Although the subject of construction delays was considered by many researchers in their respective countries or regions, this research is considered to be the first that investigate the subject of causes to delays in Kuwait. The findings of this research should be of

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importance to both local and international engineering and construction firms entering the construction market of Kuwait. The paper also presents recommendations based on the results of the survey to alleviate at least some of the prevailing problems associated with construction project management.

### 2. LITERATURE REVIEW

Delays in construction projects are still very common in most parts of the world even with the introduction of modern management techniques. The pioneer study on delay causes was done by Baldwein and Manthei (1971) who studied the causes of delay in building projects in the United States. This study surveyed engineers, designers and contractors. They found substantial agreement among the three groups concerning the causes of delay. Five new studies, Mansfield *et al.* (1994), Kaming *et al.* (1997), Chan *et al.* (1997), Assaf *et al.* (1995) and Mezher *et al.* (1998) outlined the main causes of delay in large construction and building projects and their relative importance in Nigeria, Indonesia, Hong Kong, Saudi Arabia and Lebanon respectively according to view of the public clients, consultants and contractors.

Mansfield *et al.* investigated and ranked the important factors responsible for delays and cost overruns in highway construction projects in Nigeria by using the severity index. The main factors were found to be delay of payment for completed works, poor contract management, inaccurate estimating, and price fluctuation during construction. Kaming *et al.* survey on Indonesia construction industry identified predominant delay factors, using factor analysis technique, to be design changes, poor labor productivity, inadequate planning and resource shortages. Chan *et al.* used the 'relative importance index' to rank 83 hypothetical causes of delays among the three parties. Both Assaf *et al.* and Mezher *et al.* studies incorporated 56 hypothetical causes of delays, which were categorized into nine major groups. They included materials, equipment, manpower, financing, environment changes, governmental relationships, contractual relations, and scheduling and controlling techniques. The effects of the individual and the major groups on project delays were measured and ranked by their importance for clients, designers and contractors. The surveyed data were analyzed using 'relative importance index' and 'rank correlation coefficient'. Level of importance of the causes and the groups were measured and ranked by their importance index for clients, contractors and architectural/engineering firms. The observation from the survey conducted in Saudi Arabia led to the conclusion that

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important delay factors were preparation and approval of shop-drawing, delay of contractors' payments, cash problems and subcontractors' poor scheduling. The last study conducted in Lebanon surveyed the same hypothetical causes and groups, and used same ranking technique. It was found that all parties ranked the financing group of delay factors as the highest. Clients ranked financing and scheduling of subcontractors as the top causes of delays, while the contractors ranked contractual relationship and design changes by client as the most delay factors, and finally design firms ranked poor project management and delay of shop drawings to be the top causes of project delays.

### 3. CAUSES OF TIME DELAYS

A project may be delayed for a large number of reasons (factors). The work described in this research was accomplished in two stages. In the first stage a total of 53 relevant delay factors were identified to have influence on time delays through field project visits, interviews with governmental administrative and engineering personnel (clients), contractors and consultants. In the second stage, a questionnaire was designed taking into consideration these identified factors, and distributed to these three parties. The purpose of the questionnaire was to assess the relative importance of each of these identified causes.

The factors identified in the first stage were classified into eight major groups: (1) Client Administration and Organizational factors; (2) Client Site Supervision factors; (3) Contractor related factors; (4) Labor Force related factors; (5) Quality Related Factors (6) Design Related factors; (7) Project management related factors; and (8) Contractual related factors. The following is a brief description of these factor groups:

#### **Client's Administration and Organizational Factors**

- M1: Slow decision - making process by client's administration.
- M2: Inefficient flow of information from among client's departments.
- M3: Lack of field and construction expertise by the administration staff.
- M4: Bureaucracy in client's administration.
- M5: Inflexibility by client's administration toward design, construction and material alternatives submitted by contractors.
- M6: Inefficient pre-qualification procedures by the client, which result

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in the selection of incompetent contractors.

- M7: No or small time extensions associated with change orders initiated by the client.
- M8: Poor job control over clients' site supervision staff.
- M9: Poor coordination with other regulatory and governmental agencies.

### Client's Field Supervision Factors

- S1: Slow site inspection procedures by the client's supervision staff.
- S2: Understaffed client's project and site personnel.
- S3: Unfamiliarity or lack of knowledge by the client's supervision staff toward new construction methods, materials and techniques.
- S4: Lack of application of construction management tools and techniques by client's project and site staff.
- S5: Limited authority is given to client's project/site personnel to approve necessary design changes.
- S6: Slow financial and payment procedures adopted by the client toward the contractors.
- S7: Client's supervision staff is apprehensive in making decisions (it may be interpreted as favoritism towards the contractor).

### Contractor Related Factors.

- C1: The contractor lacks the required experience and familiarity with this type of construction work
- C2: Frequent construction errors committed by the contractor.
- C3: Misinterpretation of drawings and specifications.
- C4: Late construction mobilization by contractors leads to construction delays.
- C5: Poor contractors' site management and planning.
- C6: Contractors intently do not hire competent specialized sub-contractors.
- C7: Frequent errors in contractor's shop drawings

### Design Related Factors

- D1: Poor coordination between various types of design drawings (i.e. architectural, structural, mechanical, electrical).
- D2: Errors in the design drawings.

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- D3: Slow shop drawing review and approval by the designer.
- D4: Poor or no constructability considerations during design.
- D5: Design drawings do not match with specifications.
- D6: Inaccurate initial project scope estimate.
- D7: Unsuitable or over-design practice by the client which requires extensive time during construction.
- D8: Frequent design changes requests by the client during construction.

### **Project management related factors.**

- P1: Poor contractor's planning, scheduling and control.
- P2: No application of construction management procedures on the part of the client contributes to late detection of construction problems.
- P3: Poor judgment and experience in estimating procedures by the contractor.
- P4: Unrealistic schedule program submitted by contractor.
- P5: Contractor's staff is not properly trained in professional construction management techniques.
- P6: Poor coordination between contractor's construction program and that of the sub-contractor's

### **Manpower related factors**

- L1: Difficulty in finding the required manpower from the market.
- L2: Delays in obtaining the necessary visas for the required manpower.
- L3: Poor manpower skills due to low wages.
- L4: Fluctuating productivity levels corresponding to the different manpower ethnic backgrounds.
- L5: Disorientation of the manpower in the Kuwaiti environment due to their alien backgrounds.
- L6: Difficulty of working during summer and Ramadhan months.

### **Quality Related Factors:**

- Q1: Strict application of quality control criteria by the client.
- Q2: Unavailability of construction material in the local market at the required quantities.
- Q3: Delays attributed to third party testing of construction material.
- Q4: Differing or unexpected geo-technical conditions during construction.

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- Q5: Poor construction performance by the subcontractors.

### Contractual related factors

Factors relating to clauses of contract between client and the contractor.

- T1: Risk allocation shifts mainly towards the contractor as reflected by the lump sum contract clauses.
- T2: No financial incentives for contractors to finish ahead of schedule.
- T3: Liquidated damages are not high enough to make contractors more responsible towards completing the project on time.
- T4: Poor contract negotiation during tendering which results in incompetent relationship between client and contractor.
- T5: Unrealistic project construction duration as specified in the contract.
- T6: Traditional contract type (lump sum or unit price) hampers contractor's production.

The questionnaire dealt with questions relating to the opinions of the respondents on the effect of each factor on the project delay. The responses were divided into a 5-point scale to assess the level of effect, where '1' represented the lowest level of the effect and '5' the highest level of the effect.

Copies of the questionnaire were mailed randomly to 50 governmental administrative personnel and site engineers (i.e. client's representatives) and to 100 different registered local contractors and professional engineering firms that have dealt with governmental housing and building types projects. The respondents were 23 clients' personnel, 17 Contractors and 8 Designers. The range of experience of the participants ranged from 4 to 30 years in the construction industry.

## 4. METHOD OF DATA ANALYSIS

The method adopted in this study for the analysis of the data collected from the current questionnaire survey, was "the relative important index" (RII) developed by Kometa *et al* (1994) it determines the relative importance of attributes of client's organizations which may influence project consultant's performance. The relative index was applied to compare the index to various participants (i.e., contractors, client and consultant). A five-point scale was used and transformed to the relative important indices for each factor to determine the ranks of the different causes. These rankings

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cross-compare the relative importance of the factors as perceived by the three groups of participants. RII was evaluated using the following expression:

$$RII = \frac{\sum_{i=1}^5 w_i x_i}{A \times N} \quad (1)$$

Where  $w$  = weighting given to each factor by the respondents and it ranges from 1 to 5 where '1' is not significant and '5' is extremely significant,  $x$  = frequency of the  $i$ th response given for each cause,  $A$  = highest weight (i.e. 5 in this case), and  $N$  = total number of participants.

The respondent to the survey has to select one weight (level of significance) for each factor causing a delay. There are 5 levels of weight, ranging from 1 (Not significant) to 5 (highly significant). The summations of all of the respondents' answers are averaged using the RII equation.

In order to measure the agreement in quantitatively ranking between different groups of participant Okpala *et al* (1988) used a 'Rank Agreement Factor' (RAF) for any two groups which shows the average absolute difference in the factors' rankings. For any two groups let  $RII_{1j}$  be the rank of item in Group 1 and  $RII_{2i}$  be the rank of the  $i$ th item in Group 2,  $N$  be the number of items and  $j = N - i + 1$ . RAF is defined as:

$$RAF = \frac{\left[ \sum_{i=1}^N |RII_{1j} - RII_{2i}| \right]}{N} \quad (2)$$

IF the value of RAF is zero, a perfect agreement is reached. As the value of  $RAF$  gets higher value, a lesser agreement between the two groups is concluded. The percentage agreement (PA) can be calculated by dividing  $RAF$  by  $RAF_{max}$ , where  $RAF_{ma}$  is as follows:

$$RAF_{max} = \frac{\left[ \sum_{i=1}^N |RII_{1j} - RII_{2i}| \right]}{N} \quad (3)$$



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The 'Percentage Agreement' (PA) can be calculated as:

$$PA = 100 - \frac{RAF}{RAF_{max}} \quad (4)$$

when *RAF* and *PA* indicate the degree of consensus on delay cause factors between the construction and the project parties.

### 5. RESULTS AND DISCUSSION

The responses were reviewed and analyzed using spreadsheet software. The factors that cause delays under each group or category are summed to give the relative importance index and rank for that particular group or category by using the RII equation. (e.g. Client's Administration and organizational Factors, etc.). Table 1 shows the relative importance index and rank for each of the 53 factors; while Table 2 shows the relative the relative importance index and rank for each of the eight groups. Both Tables categorize the RII index and rank given by the clients, consultants, and contractors for the housing type projects in Kuwait. The following is a brief discussion of the different groups of delays as deduced from Tables 1 and 2:

#### **Client's Administration and Organization:**

By using the RII ranking method, with the client's administration and organization group the delay factors associated was ranked lower by the clients' respondents than by both contractors and design firms. In this group, slow decision making process in the client's organizations was the most important factor as it was ranked first by contractors and second by design firms. The second factor was the pre-qualification procedures for contractors and subcontractors. Clients' organizations are large and suffer from a long line of authoritative managers. For example, Figure 1 illustrates the current organization structure of an existing governmental agency that deals with major construction projects in Kuwait. In this figure the procedures that require the attention of the Under-secretary pass through six levels of hierarchy. As a consequence, slow decision process is expected. Also poor planning by the client's organization, government bureaucracy, and some times corruption are other factors contributing to delays.

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Table 1 Index and rank of different delay factors

|                    |    | Owner  |      | A/E Firms |      | Contractor |       |    |
|--------------------|----|--|------|-----------|------|------------|-------|----|
|                    |    | Index  | Rank | Index     | Rank | Index      | Rank  |    |
| Management Related | M1 | Slow decision-making process                     | 0.73 | 12        | 0.93 | 2          | 0.88  | 1  |
|                    | M2 | Inefficient Flow of information                  | 0.64 | 29        | 0.85 | 11         | 0.684 | 27 |
|                    | M3 | lack of field/project experience                 | 0.50 | 48        | 0.73 | 36         | 0.55  | 45 |
|                    | M4 | Uncooperative management                         | 0.60 | 34        | 0.46 | 53         | 0.51  | 51 |
|                    | M5 | Inflexibility toward alternatives                | 0.65 | 27        | 0.80 | 23         | 0.73  | 17 |
|                    | M6 | Inefficient Pre-qualification procedures         | 0.71 | 19        | 0.81 | 19         | 0.68  | 28 |
|                    | M7 | Short time extensions for variation orders       | 0.53 | 46        | 0.73 | 36         | 0.75  | 13 |
|                    | M8 | Lack of site attendance control                  | 0.44 | 54        | 0.82 | 18         | 0.48  | 52 |
|                    | M9 | Poor coordination with regulatory agencies       | 0.59 | 35        | 0.81 | 19         | 0.74  | 15 |
| Supervision        | S1 | Inspection procedures                            | 0.46 | 51        | 0.83 | 14         | 0.64  | 35 |
|                    | S2 | Understaffed project personnel                   | 0.61 | 33        | 0.63 | 45         | 0.60  | 42 |
|                    | S3 | Unfamiliarity with new methods                   | 0.57 | 39        | 0.81 | 19         | 0.61  | 40 |
|                    | S4 | Lack of construction management training         | 0.59 | 37        | 0.83 | 14         | 0.66  | 31 |
|                    | S5 | Limited authority among supervision staff        | 0.72 | 17        | 0.91 | 3          | 0.88  | 1  |
|                    | S6 | Slow financial and payment procedures            | 0.81 | 6         | 0.91 | 3          | 0.88  | 1  |
|                    | S7 | Apprehensive towards contractor's favoritism     | 0.70 | 20        | 0.90 | 5          | 0.86  | 4  |
| Contractor         | C1 | Inadequate contractor experience                 | 0.63 | 31        | 0.74 | 35         | 0.53  | 47 |
|                    | C2 | Errors in Construction                           | 0.69 | 21        | 0.73 | 36         | 0.50  | 50 |
|                    | C3 | Misinterpretation of drawings and specifications | 0.76 | 8         | 0.61 | 46         | 0.54  | 46 |
|                    | C4 | Late construction mobilization                   | 0.83 | 4         | 0.86 | 9          | 0.64  | 36 |
|                    | C5 | Poor site management and planning                | 0.87 | 1         | 0.71 | 40         | 0.56  | 44 |
|                    | C6 | Lack of competent specialty subcontractors       | 0.72 | 15        | 0.81 | 0.89       | 0.61  | 41 |
|                    | C7 | Contractors shop drawings errors                 | 0.69 | 22        | 0.73 | 36         | 0.60  | 42 |
| Design             | D1 | Lack of design drawings coordination             | 0.72 | 18        | 0.85 | 11         | 0.2   | 6  |
|                    | D2 | Design drawings errors                           | 0.52 | 47        | 0.61 | 46         | 0.76  | 11 |
|                    | D3 | Inefficient Shop drawings approval               | 0.53 | 45        | 0.76 | 24         | 0.71  | 20 |
|                    | D4 | lack of constructability applications            | 0.57 | 40        | 0.56 | 50         | 0.66  | 32 |

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|                            |    |  |      |    |      |    |      |    |
|----------------------------|----|--|------|----|------|----|------|----|
| <b>PROJECT</b>             | D5 | Design drawings and specifications do not match                          | 0.50 | 50 | 0.56 | 50 | 0.63 | 38 |
|                            | D6 | Inaccurate initial project scope estimate                                | 0.45 | 52 | 0.61 | 46 | 0.58 | 43 |
|                            | D7 | Over-design practice by client   | 0.72 | 14 | 0.76 | 25 | 0.71 | 20 |
|                            | D8 | Design Changes by owner's  | 0.66 | 24 | 0.86 | 9  | 0.76 | 12 |
|                            | P1 | Lack of planning and use of CPM  | 0.76 | 9  | 0.95 | 1  | 0.71 | 22 |
|                            | P2 | Lack of professional construction  | 0.63 | 32 | 0.81 | 19 | 0.74 | 16 |
|                            | P3 | Lack of planning & control on the side of the subcontractors             | 0.80 | 7  | 0.83 | 14 | 0.72 | 18 |
|                            | P4 | Unrealistic contractor program.  | 0.84 | 3  | 0.80 | 23 | 0.67 | 29 |
|                            | P5 | Lack of Contractors staff training on construction management techniques | 0.82 | 5  | 0.83 | 14 | 0.70 | 24 |
|                            | P6 | Poor scheduling of subcontractors  | 0.86 | 2  | 0.88 | 7  | 0.70 | 24 |
| <b>LABOR</b>               | L  | Manpower shortage in the Market  | 0.72 | 16 | 0.78 | 26 | 0.77 |    |
|                            | 1  |  |      |    |      |    |      |    |
|                            | L2 | Manpower Visas difficulty  | 0.63 | 30 | 0.78 | 26 | 0.67 | 30 |
|                            | L3 | Poor manpower skills   | 0.74 | 11 | 0.78 | 26 | 0.70 | 26 |
|                            | L4 | Fluctuating productivity levels  | 0.74 | 10 | 0.88 | 7  | 0.75 | 8  |
|                            | L5 | Manpower disorientation in Kuwait  | 0.64 | 28 | 0.85 | 11 | 0.75 | 14 |
|                            | L6 | Difficulty of working during Summer/Ramdhan                              | 0.65 | 26 | 0.75 | 34 | 0.80 | 7  |
| <b>Quality</b>             | Q1 | Strict application of quality control program                            | 0.66 | 25 | 0.78 | 20 | 0.77 | 9  |
|                            | Q2 | Unavailability of Construction material                                  | 0.66 | 32 | 0.68 | 42 | 0.69 | 27 |
|                            | Q3 | Testing of construction materials  | 0.45 | 53 | 0.35 | 54 | 0.65 | 33 |
|                            | Q4 | Differing site conditions  | 0.56 | 52 | 0.76 | 24 | 0.65 | 33 |
|                            | Q5 | Selection of incompetent sub contractors                                 | 0.57 | 45 | 0.74 | 36 | 0.51 | 48 |
| <b>Contractual Related</b> | T1 | Risk allocation mainly on the contractor.                                | 0.73 | 13 | 0.80 | 23 | 0.86 | 5  |
|                            | T2 | Week Contract clauses  | 0.56 | 41 | 0.66 | 44 | 0.51 | 48 |
|                            | T3 | Small-liquidated damages   | 0.55 | 44 | 0.56 | 50 | 0.37 | 53 |
|                            | T4 | Poor contract negotiation  | 0.50 | 49 | 0.64 | 44 | 0.31 | 54 |
|                            | T5 | unrealistic project duration estimate                                    | 0.56 | 42 | 0.70 | 40 | 0.70 | 23 |
|                            | T6 | Contract type  | 0.69 | 23 | 0.76 | 25 | 0.71 | 19 |

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Table 2. Index and rank of major delay categories

| Category                  | Owner |      | A/E   |      | contractor |      |
|---------------------------|-------|------|-------|------|------------|------|
|                           | Index | Rank | Index | Rank | Index      | Rank |
| Client's administration   | 0.59  | 6    | 0.77  | 3    | 0.66       | 5    |
| Client's site supervision | 0.64  | 4    | 0.83  | 2    | 0.74       | 1    |
| Contractor related        | 0.75  | 2    | 0.76  | 4    | 0.56       | 8    |
| Design related            | 0.59  | 6    | 0.69  | 6    | 0.69       | 4    |
| Project management        | 0.78  | 1    | 0.85  | 1    | 0.70       | 3    |
| Manpower related          | 0.70  | 3    | 0.73  | 5    | 0.71       | 2    |
| Quality related           | 0.57  | 8    | 0.66  | 8    | 0.65       | 6    |
| Contractual related       | 0.60  | 5    | 0.68  | 7    | 0.57       | 7    |

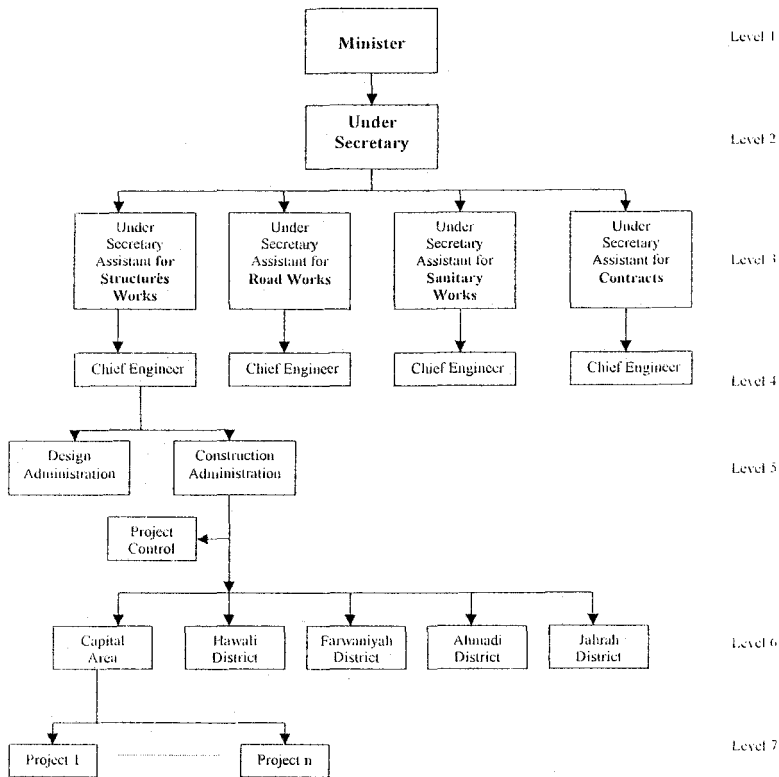


Fig. 1 Current client's organizational structure

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### **Client's Site and Field Supervision:**

Both designers and contractors agree that the delay factors associated with the client's site supervision group are the most important. The contractor ranked limited authority given to the client's supervisory staff to approve minor change orders and approve new construction alternatives as the most significant delay factor. They also ranked client's slow processing of the contractor's payment certificates to be the top cause of construction delays. Designers agree on these two causes as top factors.

Surprisingly the client admits that the slow processing of contractors' payment is a major cause of construction delay. Moreover, both the contractors and designers firms think that the view of favoritism toward the contractor proposals is making the client's supervision staff afraid of taking decisions and prefers to have top client's top administration staff make the needed decisions and approvals. On the other hand, all respondents agreed that understaffed site staff factor is the least important in this group.

### **Contractor related factors:**

This group was ranked high by the client. Poor contractors' site management and planning was ranked the top. They also ranked contractors' late construction mobilization and misinterpretation of drawings and specifications major causes to project delays. The design firms ranked late mobilization higher than other delay factors in this group. They also ranked unavailability of competent subcontractors in Kuwait market as a major factor. It is interesting to see that contractors do not agree with both clients and design firms that they are a major source of construction delays. In this group, lack of necessary construction skills and experience by the contractors received low rating. The discrepancy of ranking among the three parties in this group confirms the existence of an adversary relationship between clients and contractors in one hand and between design firms and contractors in the other hand. This suggests the necessity for the application of professional construction management practices that build the spirit of teamwork and professional trust among the construction contractual parties.

### **Design Related Factors**

All parties agree on the fact that poor co-ordination between various types of design drawings in the client's organizations as the more important delay factor in the

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design phase. The lack of application of constructability during design phase is the least important factor. In this group, the three parties rank the design changes delay factor somewhat high. The contractors rated design errors as a major cause of project delays. It is worth mentioning that many reputable design firms have suffered from the immigration of their professional staff after the Gulf war and find a gap in their organization structure. Therefore, these firms are in desperate need for many skilled engineers and architect In addition, clients do not spend enough time with design firms during the design phase to ensure that their requirements are met.

### **Project Management**

All three parties ranked project management group of delays to be a top delay factor. Designers ranked poor planning and the lack of using the Critical Path Method (CPM) in scheduling and control of construction activities as the top factor causing construction delays. The clients agree to this cause as they have ranked it as an important factor. The clients have also ranked poor scheduling of subcontractors, unrealistic contractors' work programs, and untrained contractors' staff on the management techniques as important factors causing construction delays. The contractor on the other hand gave lower ranking to these factors than the clients and designers. This group mainly focuses on the application of construction project management techniques. This clearly shows that there is a lack of the application of project management techniques in governmental projects. There is a shortage of construction managers in Kuwait and the industry as a whole lacks professionalism. It is evident that contractors' organizations need to adopt human resources department and train their engineers in the principles and techniques of project management.

### **Manpower Factors**

This group ranked high among all of the three parties. Manpower needed for construction in Kuwait is available from Arab and Asian countries. All parties thought that fluctuating productivity levels corresponding to different ethnic backgrounds is the most important factor in the labor force. The clients have some concerns on limited manpower productivity that exists because of lower wages; while designers considered the disorientation of the manpower in the Kuwait market is a major factor to be considered. The difficulty to work during summer months in Kuwait and during the holy month of Ramadhan are factors that contractors thought to contribute to project

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delays. Difficulty in obtaining the necessary visas for the required manpower is the least determining factor.

### Quality Related Factors

All parties ranked this group lower than the other groups. This result is mainly due to the fact that Kuwait is an open market country that does not strict importing of building materials from abroad. It is noteworthy, however, that contractors rated strict application of quality control criteria and inflexibility in accepting alternatives lead to construction delays. The least significant factor is the occurrence of unexpected geo-technical conditions, which is due to the plain desert nature of Kuwait land.

### Contractual Related Factors

This group received low ranking, among the three parties, as a contributor to project delays. The allocation of project risks on the contractor ranked high among contractors. This concept is making the contractors to be more strict in adopting techniques that can have major cost impacts on them and thus preferring to delay risky items until the clients approve any request of information items.

### Cross Comparison of RII

Table 3 provides a cross-comparison of the relative importance of the major categories as perceived by the different groups of respondents by utilizing RAF and percentage agreement (PA). A stronger consistency is noted between the clients and design firms' views on the factor categories causing delays (62.1%). On the other hand clients and contractors do not seem to agree very much (34.5%). This not surprising in Kuwait as claims and litigation are normal in governmental construction projects.

**Table 3 Level of agreement among the three participants**






| Project participants  | Rank Agreement Factor | Percentage Agreement |
|-----------------------|-----------------------|----------------------|
| Clients and A/E firms | 1.38                  | 62.1%                |

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|                           |      |       |
|---------------------------|------|-------|
| Clients and Contractors   | 2.38 | 34.5% |
| A/E Firms and Contractors | 2.00 | 44.8% |

### RECOMMENDATIONS:

The author can point recommendations based on the results of this study. The following recommendations can be made from this study:

-  The decision making process is extremely time consuming and the flow of information between project level and client's administration level is inefficient. To avoid this, a special consultant office along with a selected professional managerial committee from both MPW and NHA should be set up to review, study and establish efficient and practical procedures at the administration level.
-  Low contract bidders do not signify that the project will wind up at lower cost within the specified time. A periodical evaluation of contractors and manufacturers should be carried out by special pre-qualification committee within each ministry or agency. In order to achieve the established plans and avoid future crisis with contractors, selection of contractors or sub-contractors should be bound to project size, time limit, quality required etc.
-  Governmental employees need to be empowered trained, trusted, and accountable for their decisions
-  In order to achieve competence, MPW and NHA should invite and encourage local consultant offices to participate in the design or supervision of governmental projects.
-  The application of professional construction management (CM) practices that builds the spirit of teamwork and professional trust among the construction contractual parties is necessary. The owner should schedule his structure contracts for the project using the CM approach. The CM approach establishes the procedures for award of all contracts to designers, main vendors, and trade contractors. Once contractual relationships are established, the CM not only



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controls the prime contractor but also all subcontractors as well as major vendors and off-site fabricators.

- Both clients' site personnel and local contractors should adopt CPM and advanced technology in the management and control of projects. Moreover the clients should enforce the use of these tools.
- Efforts should be exerted towards automation of project's communication and documentation flow.
- Client's site management staff should be empowered to take independent decisions.
- The organization structure hierarchy of governmental agencies handling the construction industry should be examined closely to improve the decision making process related to projects and the flow of information from project management to top management and vice-versa. Although different organizational structures such as the Matrix Organization structure and the Project Organization structure are difficult to incorporate and adopt by MPW and NHA. It is recommended that some of the level in the existing traditional organization structures to be merged, such as merging the under-secretary level and chief engineer level into one level.
- As opposed to liquidated damages, a scheme to provide financial incentives for contractors who finish projects on time should be implemented by incorporating incentive or bonus clauses in the contract. Bonuses may be prescribed for progress determinants as well as for quality determinants. Such clauses are excellent means of rewarding constructors for finishing early and for high quality work.

## 6. CONCLUSION

A survey of selected sample of client personnel, contractors and designers on the causes of delays in different sizes of building and housing projects in Kuwait was carried out. A questionnaire containing 53 delay causes was distributed and the responses analyzed. The factors were categorized and ranked using relative importance factor. The factors ranking high under each group were taken as the most influencing

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factors. Based on these results, some recommendations for further improvement are pointed out.

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