



## ***ACKNOWLEDGEMENTS***

I would like to thank my Supervisor Dr. Abdalla Shigidi for his professional advice and assistance.

My friends deserve credit for turning monotonous work into a great deal of fun. They always seemed to know when to encourage me to work on this research or to do something interesting. My brothers and sisters were always great friends before I started graduate work and will always remain to be so.

Finally, I dedicate this work to my mother and father, who have always given me the inspiration and enthusiasm to accomplish everything I desired.

# Abstract

Execution time is one of the performance measures of construction projects, which are time, cost, and quality. Project success is measured by these measures which show the performance of the construction parties involved, mainly the owner and the contractor. This study presents the results of a survey undertaken to determine and evaluate the most severe and most frequent factors causing delay in Sudan and Dubai construction projects. A survey based on a questionnaire was carried out among randomly selected contractors, consultants, and owners. The experience-based survey is a crop of over sample 1363 construction projects that had been experienced by 50 professionals (contractors, consultants, and owners) from Sudan and the Dubai and covers 61 previously identified delay factors, grouped into five major categories. The main causes of delay are analyzed and ranked according to their frequency of occurrence and severity.

The results of the study proved that construction projects suffer delays. 98% of participants were involved in projects that had not been completed as planned. Furthermore, % 72 of projects in Sudan had been subject to delay. However, results were found in the Dubai as 73 % of projects in Dubai had been completed within the project plan or before and 27% of the Project delayed. It was also found that the causes of delay are different between Sudan and Dubai. However, relatively similar results in the both countries with regard to category rank were obtained; since the contractor performance delay group was considered as the most important group, while consultant-related factors were ranked as the least important category in both countries also The direct answers of the three respondents from both countries on this issue showed that the contractor who is most often responsible for delays.

## مستخلص

يعتبر زمن التشييد من اهم العوامل المؤثرة فى مشاريع الانشاءات جنبا الى جنب مع كلا من الجوده والتكلفه ، لذا يهتم كل من طرفى المشروع (المالك- الم قاول) من الحرص على توفر هذه العوامل بما يرضى جميع الاطراف .

وتقدم هذه الدراسه اهم العوامل واكثرها تكرارا وتأثيرا على زمن تنفيذ المشروعات في كل من السودان ودبي. وأجري مسح بوساطة استبيان جمع عشوائيا من عدة مصادر بين م قاولين واستشاريين وملاك . وحصل على أكثر من 1363 مشروع من 50 مصدر مختلف (م قاولين واستشاريين وملاك) في كل من السودان ودبي وغطي 61 عاملا سبق تحديدها كعوامل لتأخير ، و قد صنفت هذه العوامل إلى خمس فئات رئيسية ليتم تحليلها وترتيبها وفقا لمدى تكرارها وحدة تأثيرها على مشروعات التشييد .

وتظهر النتائج ان 98 ٪ من المشاركين كانوا مرتبطين في مشاريع لم تكتمل كما كان م قورا. وعلاوة على ذلك فان هناك نسبة 72 ٪ من المشروعات في السودان تعرضت للتأخير. ومع ذلك ، في دبي كانت النتائج 73 ٪ من المشروعات في دبي قد أنجزوفا للخطة أو قبل ذلك وتأخر أيضا 27 ٪ منها . وجد أن مستوى أهمية عوامل التأخير مختلفة نسبيا من السودان إلى دبي. ومع ذلك ، و قد تحصل على نتائج مشابهة في كل من البلدان فيما يتعلق رتبة السبب المسئول عن التأخير ؛ فيما وجد فئة اسباب التي تعزى لأداء الم قاول هي الأكثر أهمية ، في حين ان العوامل المتصلة بالاستشاري كانت تصنف في الفئة الأقل أهمية في كلا البلدين أيضا والأجوبة المباشرة من العينا ت التي تمثل اطراف المشروع الثلاثة المستطلعين الثلاثة من كلا البلدين ابانت وبجلاء أن الم قاول الذي هو في أغلب الأحيان مسئول عن التأخير.

## Table of Content

| Content  | Page      |
|--|-----------|
| Abstract   | III       |
| Table Of Contents  | V         |
| List Of Figures  | VII       |
| List Of Tables   | IX        |
| List Of Equation   | X         |
| <b>Chapter 1 Introduction</b>                            | <b>1</b>  |
| 1.1 General  | 2         |
| 1.2 Problem Statement                                    | 3         |
| 1.3 Research Objectives                                  | 4         |
| <b>Chapter 2 Literature Review</b>                       | <b>5</b>  |
| 2.1. General   | 6         |
| 2. 2 The Construction Industry in General                | 6         |
| 2.2.1 The Nature Of The Construction Industry            | 6         |
| 2.2.2 The Sudan Construction Industry                    | 8         |
| 2.2.3 The Dubai Construction Industry                    | 10        |
| 2.3 Types of Delay                                       | 14        |
| 2.3.1 According to the liability of the construction     | 14        |
| 2.3.2 According to Occurrence                            | 17        |
| 2.3.3 According to Effect                                | 18        |
| 2.3.4 Causes of delay Identification and                 | 18        |
| 2.3.5 Causes of delay The Outcome of Previous<br>Studies | 22        |
| <b>Chapter 3 Causes of Delay</b>                         | <b>23</b> |
| 3.1 General  | 24        |
| 3.2. Causes of Delay in Construction Projects            | 24        |
| 3.2.1 Contractor Related Factors                         | 24        |

|   |               |
|---|---------------|
| 3.2.2 Consultant Related Factors  | 32            |
| 3.2.3 Owner Related Factors   | 34            |
| 3.2.4 Others Factors  | 36            |
| <b>Chapter 4 Research Design and Methodology</b>  | <b>40</b>     |
| 4.1 General   | 41            |
| 4.2 Research Design   | 41            |
| 4.3. Questionnaire  | 41            |
| 4.4. Questionnaire Writing, Distribution & Collection   | 43            |
| 4.4.1 Khartoum  | 44            |
| 4.4.2. Dubai  | 44            |
| 4.5. The Survey Sample  | 44            |
| 4.6. Data Collection  | 45            |
| 4.7. Faults in The Survey Design  | 46            |
| 4.8. Method of Analysis   | 47            |
| <br><b>Chapter (5) Analysis and Results</b>   | <br><b>49</b> |
| 5.1. General  | 50            |
| 5.2. Data Statistics and Analysis   | 50            |
| 5.2.1. Fundamental Analysis   | 50            |
| 5.2.2. Causes of Delay  | 67            |
| 5.2.3. Analysis of Delay Causes -   |               |
| Categories and Individuals  | 68            |
| 5.2.4. Test of The Hypotheses   | 77            |
| <br><b>Chapter (6) Conclusion</b>   | <br><b>79</b> |
| 6.1. General  | 80            |
| 6.2. Result out Line  | 80            |
| 6.2.2. Delay Causes - Extent of Difference in Their<br>Importance Between Sudan and the Dubai | 80            |
| 6.2.3. Most Important Causes of Delay   | 81            |
| <br><b>Glossary</b>   |               |
| <b>References</b>   |               |
| <b>Appendixes</b>   |               |

- A- Covering Letter sent with the questionnaire  
B- Questionnaire

## List of Figures

| Figure  | Page |
|---|------|
| Figure 2.1 Construction sector shares in Amount in GDP 1995-2007                                    | 9    |
| Figure 2.2 Construction sector (%) shares in GDP during 1995-2007                                   | 10   |
| Figure 2.3 Construction permits in Dubai  | 13   |
| Figure 2.4 Types of Delay   | 14   |
| Figure 2.5 Cause-Effect relationship of construction projects                                       | 20   |
| Figure 5.1 the percent of participants  | 52   |
| Figure 5.2 Country percent of participation   | 52   |
| Figure 5.3 Sector types participants work for in relation to their countries                        | 53   |
| Figure 5.4 show the years of experience of the respondents  | 54   |
| Figure 5.5 Respondents in relation to specialty in building construction types                      | 55   |
| Figure 5.6 Percentages of respondents regarding to the size of projects                             | 57   |
| Figure 5.7 Percentage of Procurement Method   | 58   |
| Figure 5.8 The frequency of respondents regarding the tendering Arrangements they have experienced. | 59   |
| Figure 5.9 The percentage of respondents who experienced delay                                      | 60   |
| Figure 5.10 The percent of the delayed projects in both countries                                   | 61   |
| Figure 5.11 linear indication of average delayed time of delayed projects in both countries         | 63   |
| Figure 5.12 the percent of average delayed time   | 63   |

|   |    |
|---|----|
| Figure 5.13 the percent of average authorized time of delayed projects in both countries                                | 65 |
| Figure 5.14 Illustration of the averages delayed time that were let passed by the owner and reported by all respondents | 65 |
| Figure (5.15) Parentage regarding most responsible party for delays   | 66 |
| <b>(5.16)</b> linear indication of the delay factors ranking in Sudan and Dubai   | 78 |



## **List of Tables**

| Table  | Page |
|--|------|
| Table 2.1 Assaf's Classification of construction delay causes                            | 21   |
| Table 4.1 Total of respondents   | 45   |
| Table 4.2 Frequency and severity weighting   | 47   |
| Table 5.1 Frequency of participation   | 51   |
| Table 5.2 Sector types that participants work for  | 53   |
| Table 5.3 show the years of experience of the respondents.                               | 54   |
| Table 5.4 Frequency in building construction types                                       | 55   |
| Table 5.5 Illustrates the main categories of project sizes. It shows that<br>the Highest | 56   |
| Table 5.6 Type of Procurement Method   | 57   |
| Table 5.7 the frequency of the tendering arrangements that experienced<br>by respondents | 58   |
| Table 5.8 Number of construction projects that respondents have<br>participated in       | 60   |
| Table 5.9 the frequency of respondents that experienced delay                            | 60   |
| Table 5.10 Ratio of delayed to non delay projects  | 61   |
| Table 5.11 The average delayed time of the delayed projects                              | 62   |
| Table 5.12 The average of delayed time authorized by the owner                           | 64   |
| Table 5.13 Frequency regarding most responsible party for delays                         | 66   |
| Table (5.14) Importance categories index and rank of delay Sudan                         | 68   |

and Dubai

|   |    |
|---|----|
| Table 5.15 Importance index and rank of all cause of delay by Sudan respondents | 69 |
|---|----|

|   |    |
|---|----|
| Table 5.16 Importance index and rank of all cause of delay by Dubai respondents | 72 |
|---|----|

### **List of Equation**

| Equation               | Page |
|------------------------|------|
| Equation 4.1 Frequency | 48   |
| Equation 4.2 Severity  | 48   |