



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكرو فيلم

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون أية تغيرات



يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %



شبكة المعلومات الجامعية



بعض الوثائق الأصلية تالفة



شبكة المعلومات الجامعية



بالرسالة صفحات
لم ترد بالأصل



DEVELOPING AN EXPERT SYSTEM FOR CONSTRUCTION PROJECTS DELIVERY IN EGYPT

By

KHALED MOHAMMED IBRAHIM WASSIF

**A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
in
CIVIL ENGINEERING**

B
9102

Under the Supervision of

Dr

AHMED RAGAEY ANIS

**Prof. of reinf. Concrete Structures
Fact. Of Eng.
Cairo University**

Dr

ADEL A. ELSAMADONY

**Prof. of Construction Management.
Fact. Of Eng. In Matareia
Helwan University**

**FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
February 2001**

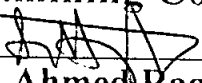
DEVELOPING AN EXPERT SYSTEM FOR CONSTRUCTION PROJECTS DELIVERY IN EGYPT

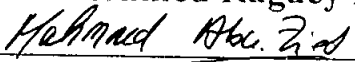
By

KHALED MOHAMMED IBRAHIM WASSIF

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
in
CIVIL ENGINEERING

Approved by the
Examining Committee :

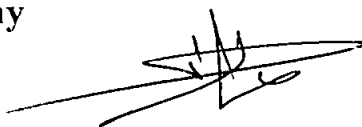

Prof. Dr. Ahmed Ragaey Anes, thesis main advisor


Prof. Dr. Mahmoud Abou Zeid

Prof. Dr. Refaat Hassan Abdel Razek

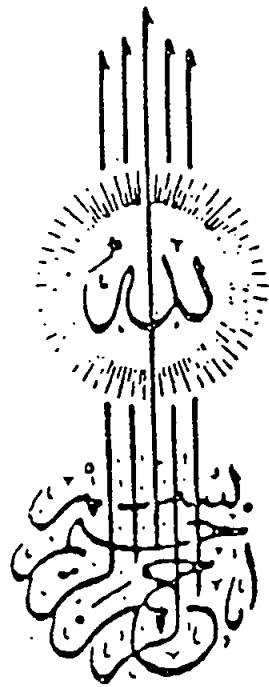
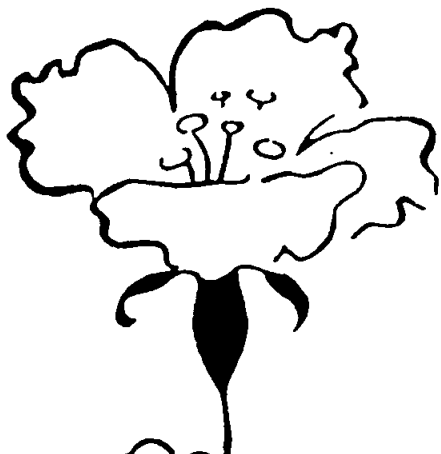


Prof. Dr. Adel Abou Elyazeed Elsamadony



FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT

2001



وما أوتينم من العلم

الاقليم

صدق الله العظيم

ACKNOWLEDGEMENT

It gives me great pleasure to acknowledge my appreciation of the vast amount of encouragement and assistance that has been forthcoming from my supervisors, Dr. **Ahmed Ragaey Anis**, Prof. of reinforced concrete structures, Cairo University and Dr. **Adel Abu Elyazed ElSamadony**, Prof of construction management, Helwan University, whose encouragement, concern, effort, suggestions, invaluable discussion and unfailing good nature have been of the utmost value that brought this work to conclusion

Thanks, deep recognition and gratitude are extended to Dr. **Mohammed Abdel Latif. Bakry**, manager of planning and information technology in social development fund for his guidance and technical support during the development of the expert system

I wish to thank all experts-listed in appendix A- for their dedication and time spent during conducting the questionnaires, for without their help this work would not have been possible.

Finally, this thesis is specially dedicated to my parents, my wife, and children for their many sacrifices during the course work of this study

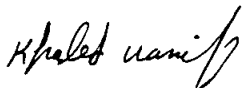

Khaled M. Wassif

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	i
TABLE OF CONTENTS	ii
LIST OF TABLES	vi
LIST OF FIGURES	viii
ABSTRACT	ix
CHAPTER I : INTRODUCTION	
1.1 General	1
1.2 Problem Statement	2
1.3 Study Objective	3
1.4 Scope	3
1.5 Methodology	3
1.5.1 Studying PDS methods and characteristics	3
1.5.2 Studying common AI techniques that are widely used in problem solving in construction	4
1.5.3 Investigating the most appropriate technique	4
1.5.4 Selecting the appropriate tool for building the required system	4
1.5.5 System development	4
1.5.6 System validation	6
1.6 Thesis chapters and structure	6
CHAPTER II: PROJECT DELIVERY SYSTEMS IN THE CONSTRUCTION INDUSTRY	
2.1 Features Of The Construction Industry	8
2.2 Project Life Cycle	9
2.3 Construction Project Categories	11
2.4 Project Delivery System	11
2.5 Components Of Project Delivery System	11
2.5.1 Scope	15

2.5.2	Organization	17
2.5.3	Contract	29
2.5.4	Award	34
2.6	Project Delivery System Selection	37
2.6.1	Governmental regulations.....	37
2.6.2	Method of funding	38
2.6.3	Project, owner, and market drivers	38
2.7	PDS's in The Construction Industry.....	39
2.7.1	Contract type and project performance.....	42
2.8	Project Delivery Systems in Egypt.....	43

CHAPTER III : ARTIFICIAL INTELLIGENCE AND PROBLEM SOLVING TECHNIQUES

3.1	Artificial Intelligence.....	47
3.2	Types of Problems	48
3.3	Problem Solving ..	49
3.4	Human Problem Solving	49
3.5	Problem Solving Techniques.....	50
3.6	Basic Search Techniques in AI.....	51
3.6.1	Blind search	51
3.6.2	Heuristic search	52
3.7	Knowledge Engineering	52
3.7.1	Knowledge based systems	53
3.7.2	Human element in expert system.....	56
3.7.3	Knowledge systems components	56
3.7.4	The building process of expert systems	62
3.7.5	Expert systems building tools	62
3.7.6	Development stages of expert systems	63
3.7.7	Expert systems applications.....	65
3.7.8	Expert systems benefits and limitations.....	66
3.7.9	When to use expert systems.....	66
3.7.10	Inexact reasoning and dealing with uncertainty.....	66