

Ain Shams University Faculty of Engineering Architecture Department

Suggested Guidelines for Achieving Efficient Health and Safety Management in Mega Construction Projects.

A THESIS

Submitted in Partial Fulfillment of the Requirements of the Degree of

MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT

Submitted by:

Waad Waheed Hamed Moustafa Ahmed

B. Sc. In Architecture (2015)

Supervised by:

A.Prof. Dr. Diaa Eldin Ibrahim A.Prof. Dr. Laila Mohamed Khodeir

Associate Professor of Architecture, Faculty of Engineering Ain Sham University

Associate Professor of Architecture, Faculty of Engineering Ain Sham University

June - 2019



Ain Shams University Faculty of Engineering Architecture Department

Name: Waad Waheed Hamed Moustafa Ahmed.

Thesis: Suggested Guidelines for Achieving Efficient Health and

Safety Management in Mega Construction Projects.

Degree: Master of Science in Architecture Engineering.

EXAMINERS COMMITTEE

Name and Affiliation	Signature
Prof. Dr. Sherif Mohamed Sabry Elattar	
Professor of Architecture Engineering, Faculty of Engineering. Fayoum University.	
Prof. Dr. Akram Farouk Mohamed.	
Professor of Architecture Engineering, Faculty of Engineering Ain Shams University.	
Date: / / 2020	



Ain Shams University Faculty of Engineering Architecture Department

Name: Waad Waheed Hamed Moustafa Ahmed.

Thesis: Suggested Guidelines for Achieving Efficient Health and Safety

Management in Mega Construction Projects.

Degree: Master of Science in Architecture Engineering

SUPERVISORS COMMIT

Name and Affiliation	Signature
A.Prof. Dr. Diaa Eldin Ibrahim Associate Professor of Architecture Engineering, Faculty of Engineering Ain Sham University	
A.Prof. Dr. Laila Mohamed Khodeir Associate Professor of Architecture Engineering, Faculty of Engineering Ain Sham University	
Date: / / 2020	

Postgraduate Student

Authorization Stamp: The thesis is authorized at / / 2020

College Board approval
/ / 2020

University Board approval
/ / 2020

Declaration

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Architecture. The work included in this research was carried out by the author in the Department of Architecture, Faculty of Engineering, Ain Shams University, Cairo, Egypt. No part of this research has been submitted for a degree or qualification at any other university or institution.

Name: Waad Waheed Hamed Moustafa Ahmed
Signature:
Date:

Acknowledgments

Praise to Allah, who has guided us to this; and we would never have if Allah had not guided us.

I would like to express my special thanks to my supervisor and a great teacher, Assoc. Prof. Dr. Diaa Eldin Ibrahim for his guidance and inspiration in helping me through the way of this success and also for his support from the initial to the final levels.

I am also very grateful and thankful and I want to express my deep appreciation to Assoc. Prof. Dr. Laila Khodier who gave me the golden opportunity to do this research, I came to know about a lot of many things. Without her constant guidance, support, help and the confidence she has on me this research will have been a little success. In every stage of this work her supervision, guidance, and advice have been shaped the research to be completed perfectly.

Dedication

I	dedicat	e this	research	i	to
---	---------	--------	----------	---	----

My loving, caring, supportive and great "Father and Mother" who have never left my side with a very special feeling of gratitude for raising me to believe that everything is possible.

My supportive Husband "Abdelrahman" for his love, advice, patience, friendship, and faith. Because he always understood.

My Daughter "Faia" for letting me tried the kind of love that people freely die for.

My very special, cheerful and loving "Brothers".

And

My Grand father's soul.

Curriculum Vitae

Name: Waad Waheed Hamed Moustafa Ahmed

Date of Birth: 24th November 1991

Place of Birth: United Arab of Emirates.

Qualification: B.Sc. Degree in Architectural Engineering, Ain Shams

University.

Graduation Year: 2015

Current Job: Architect at Diaa Consultant.

Table of Contents

	Page
List of Figures.	I
List of Tables.	III
Abstract.	V
1.Introduction.	VI
Impact of H&S to Achieve Success of MCPs.	VI
2. Problem Statement.	VII
3. The Aim.	VIII
4. Secondary Objectives	VIII
5. Hypothesis	VIII
6. Methodology	VIII
7. Research Outline	IX
8. Summary of the Proposal.	X
Chapter 1 . Literature Review	3
1.1 Introduction	3
1.2 The Nature of MCPs	3
1.2.1 Definition of MCPs	3
1.2.2 Characteristics of MCPs.	8
1.2.2.1 PN.O.L.D.C Characteristics.	8
1.2.2.2 Stakeholder Characteristics.	9
1.2.2.3 Economic Business Characteristics.	9
1.2.2.4 Risk Characteristics.	9
1.2.2.5 PP.TR Characteristics.	9

1.2.2.6 P.S.E Characteristics.	10
1.2.2.7 Complexity Characteristics.	10
1.2.3 Factors Affecting MCPs.	12
1.2.4 Challenges of MCPs.	14
1.2.4.1 PN.O.L.D.C Challenges.	14
1.2.4.2 Stakeholder Challenges.	14
1.2.4.3 Economic Business Challenges.	15
1.2.4.4 Risk Challenges.	15
1.2.4.5 PP.TR Challenges.	15
1.2.4.6 P.S.E Challenges.	15
1.2.4.7 Complexity Challenges.	15
1.2.5 Benefits of MCPs	17
1.2.5.1 PN.O.L.D.C Benefits.	17
1.2.5.2 Stakeholder Benefits.	18
1.2.5.3 Economic Business Benefits.	18
1.2.5.4 Risk Benefits.	18
1.2.5.5 PP.TR Benefits.	18
1.2.5.6 P.S.E Benefits.	18
1.3 The Root Causes of Accidents in MCPs.	20
1.3.1 Definition of Accidents	20
1.3.2 Contributing Factors to Accidents in Construction Projects	23
1.3.3 Types of Construction Accidents and Source of Injuries.	26
1.4 The Consequences of Poor H&S Management in Construction Sites.	28
1.4.1 Integrating H&S in the Design Phase.	29

		.4.1.1 Policies & Regulations Implemented Regarding the Accidents revention with the Focus on Design.	29
	1	.4.1.2 Responsible Parties of Integrating H&S into the Design Phase.	30
		.4.1.3 Developing Approaches, Models, Tools, Design Suggestions are Checklists for the Use of Designers.	nd 30
1	1.4.2	H&S Assessment tool.	31
	1	.4.2.1 Leadership and Commitment Criteria.	32
	1	.4.2.2 Policy and Strategic Goals Criteria.	33
	1	.4.2.3 Organization, Resources, and Documentation Criteria.	33
	1	.4.2.4 Planning Criteria.	34
	1	.4.2.5 Auditing and Reviewing Criteria.	34
	1	.4.2.6 Implementation and Monitoring Criteria.	37
	1	.4.2.7 Evaluation and Risk Assessment Criteria.	37
1.5	Fin	dings of Literature Review	39
1	1.5.1	Standards of Occupational H&S Management System.	39
1.6	Co	ncluding Remarks	41
Cha	pter 2	2. International Case Studies for H&S in MCPs.	44
2.1	Inti	roduction	44
2.2	Sel	ection Criteria of Case studies.	44
2.3	Cas	e study One: The Olympic Park in London.	44
2	2.3.1	Background of the Olympic Park Project.	45
2	2.3.2	H&S Aspirations of the Olympic Park (OP).	48
2	2.3.3	H&S Practices in the Olympic Park Project.	48
2.4	Cas	se study two: The Big Dig in Boston.	50
2	2.4.1	Background of the Big Dig Project.	50

2.4.2 H&S Aspirations of the Big Dig.	53
2.4.3 H&S Practices in the Big Dig.	53
2.5 Findings of Chapter 2.	56
2.5.1 Practices Related to the Standards of H&S Management System.	56
2.5.1.1 Leadership & Commitment.	56
2.5.1.2 Policy and Strategic Goals.	57
2.5.1.3 Organization, Resources and Documentation.	57
2.5.1.4 Planning.	58
2.5.1.5 Auditing and Reviewing.	58
2.5.1.6 Implementation and Monitoring.	59
2.5.1.7 Evaluation and Risk Assessment	59
2.5.2 Unique Practices Related to the Olympic Park.	60
2.5.2.1 Realize Client Role.	60
2.5.2.2 Develop competent supervisors.	60
2.6 Concluding Remarks	61
Chapter 3. National Case Studies for H&S in MCPs.	64
3.1 Introduction	64
3.2 Selection Criteria for National Case studies.	64
3.3 Case study 1: Zohr Gas Field Project.	64
3.3.1 Background of the Zohr Gas Field Project.	64
3.3.1.1 Description of Zohr Gas Field Project	65
3.3.1.2 Characteristics of Zohr Gas Field Project.	66
3.3.1.2.1 P.N.O.L.D.C Characteristics of Zohr Project.	66
3.3.1.2.2 Stakeholder Characteristics of Zohr Project.	67

	3.3.1.2.3 Business Characteristics of Zonr Project.	6/
	3.3.1.2.4 Risk Characteristics of Zohr Project.	67
	3.3.1.2.5 PP.TR Characteristics of Zohr project.	67
	3.3.1.2.6 P.S.E Characteristics of Zohr Project.	68
3.3.1.3	Factors Affecting Zohr Gas Field Project.	69
3.3.1.4	Challenges of Zohr Gas Field Project.	69
	3.3.1.4.1 PN.O.L.D.C Challenges of Zohr Project.	70
	3.3.1.4.2 Stakeholder Challenges of Zohr project.	70
	3.3.1.4.3 Business Challenges of Zohr Project.	70
	3.3.1.4.4 Risk Challenges of Zohr Project.	70
	3.3.1.4.5 PP.TR Challenges of Zohr Project.	70
	3.3.1.4.6 P.S.E Challenges of Zohr Project.	71
3.3.1.5	Benefits of Zohr Gas Field Project.	73
	3.3.1.4.1 PN.O.L.D.C Benefits of Zohr Project.	73
	3.3.1.5.2 Stakeholder Benefits of Zohr Project.	73
	3.3.1.5.3 Business Benefits of Zohr Project.	73
	3.3.1.5.4 Risk Benefits of Zohr Project.	74
	3.3.1.5.5 PP.TR Benefits of Zohr Project.	74
	3.3.1.5.6 P.S.E Benefits of Zohr Project.	74
3.3.2 The H	Root Causes of Accidents in the Zohr Gas Field Project.	75
3.3.2.1	Contributing Factors to Accidents in Zohr Gas Field Project.	75
3.3.2.2	Types of Construction Accidents in the Zohr Project	77
3.3.3 H&S	Management in the Zohr Project	77
3.3.3.1	Emergency Preparedness and Response in Zohr project.	78
3.3.3.2	H&S Management Systems in the Zohr Project.	78
3.3.3.3	Safety & Loss Prevention Engineering.	79
3.3.3.4	Main Results and Targets of H&S in Zohr Project.	79

3.4 Case study 2: Beni Suef Power Plant (BSPP).	80
3.4.1 Background of the BSPP.	80
3.4.1.1 Characteristics of the BSPP.	80
3.4.1.1.1P.N.O.L.D.C Characteristics of BSPP.	80
3.4.1.1.2 Stakeholder Characteristics of BSPP.	81
3.4.1.1.3 Business Characteristics of BSPP.	81
3.4.1.1.4 Risk Characteristics of BSPP.	81
3.4.1.1.5 PP.TR Characteristics of BSPP.	82
3.4.1.1.6 P.S.E Characteristics of BSPP.	82
3.4.1.1.7 Complexity Characteristics of BSPP.	82
3.4.1.2 Factors affecting BSPP.	83
3.4.1.3 Challenges of the BSPP.	84
3.4.1.3.1 P.N.O.L.D.C Challenges of BSPP.	84
3.4.1.3.2 Stakeholder Challenges of BSPP.	85
3.4.1.3.3 Business Challenges of BSPP.	85
3.4.1.3.4 Risk Challenges of BSPP.	85
3.4.1.3.5 PP.TR Challenges of BSPP.	85
3.4.1.3.6 P.S.E Challenges of BSPP.	85
3.4.1.3.7 Complexity Characteristics of BSPP.	86
3.4.1.4 Benefits of the BSPP.	87
3.4.1.4.1 P.N.O.L.D.C Benefits of BSPP.	87
3.4.1.4.2 Stakeholder Benefits of BSPP.	87
3.4.1.4.3 Business Benefits of BSPP.	87
3.4.1.4.4 Risk Benefits of BSPP.	87
3.4.1.4.5 PP.TR Benefits of BSPP.	87
3.4.1.4.6 P.S.E Benefits of BSPP.	87
3.4.1.4.7 Complexity Benefits of BSPP.	88
3.4.2 The Root Causes of Accidents in the BSPP.	89

3.4.2.1 Contributing Factors to Accidents in BSPP.	89
3.4.2.2 Types of Construction Accidents in BSPP.	90
3.4.3 H&S Management in the BSPP.	91
3.4.3.1 Emergency Preparedness and Response in BSPP.	91
3.4.3.2 H&S Management Systems in BSPP.	92
3.4.3.3 Safety & Loss Prevention Requirements in BSPP.	92
3.4.3.4 Main Results and Targets of H&S in BSPP.	93
3.5 Case study 3: Egypt Hydrocarbon Corporation (EHC).	94
3.5.1 Background of the EHC.	94
3.5.1.1 Characteristics of the EHC.	94
3.5.1.1.1 P.N.O.L.D.C Characteristics of the EHC.	95
3.5.1.1.2 Stakeholder Characteristics of the EHC.	95
3.5.1.1.3 Economic Business Characteristics of the EHC.	95
3.5.1.1.4 Risk Characteristics of the EHC.	95
3.5.1.1.5 PP.TR Characteristics of the EHC.	96
3.5.1.1.6 P.S.E Characteristics of the EHC.	96
3.5.1.2 Factors affecting the EHC.	97
3.5.1.3 Challenges of the EHC.	98
3.5.1.3.1 P.N.O.L.D.C Challenges of the EHC.	98
3.5.1.3.2 Stakeholder Challenges of the EHC.	98
3.5.1.3.3 Business Challenges of the EHC.	98
3.5.1.3.4 Risk Challenges of the EHC.	98
3.5.1.3.5 PP.TR Challenges of the EHC.	99
3.5.1.3.6 P.S.E Challenges of the EHC.	99
3.5.1.4 Benefits of the EHC.	100
3.5.1.4.1 P.N.O.L.D.C Benefits of the EHC.	100

3.5.1.4.2 Stakeholder Benefits of the EHC.	100
3.5.1.4.3 Business Benefits of the EHC.	100
3.5.1.4.4 Risk Benefits of the EHC.	100
3.5.1.4.5 PP.TR Benefits of the EHC.	100
3.5.1.4.6 P.S.E Benefits of the EHC.	101
3.5.2 The Root Causes of Accidents in the EHC.	102
3.5.2.1 Contributing Factors to Accidents in EHC.	102
3.5.2.2 Types of Construction Accidents in EHC.	104
3.5.3 H&S Management in the EHC.	105
3.5.3.1 Emergency Preparedness and Response in the EHC.	105
3.5.3.2 H&S Management Systems in the EHC.	105
3.5.3.3 Safety & Loss Prevention Requirements in the EHC.	106
3.6 Findings.	107
3.6.1 H&S Applied Checklist.	107
3.7 Concluding Remarks.	109
Chapter 4 .Application of Questionnaire Survey.	113
4.1 Introduction	113
4.2 Questionnaire Method	114
4.3 Structure of the Questionnaire.	115
4.4 Sample characteristics	116
4.5 The general knowledge of the respondents about H&S in MCPs.	. 117
4.6 Findings and Discussions	117
4.6.1 Leadership and Commitment Criteria	118
4.6.2 Policy and Strategic Goals Criteria.	118
4.6.3 Organization, Resources, and Documentation Criteria.	119