

## **Acknowledgement**

I would like to express my special thanks and sincere gratitude to Dr: **Salma Yahia Mohamed** for her supervision on this study and her advice and guidance during the preparation of this dissertation and for her valuable comments, which have had a major impact on the structure of my thesis.

Special appreciation is also extended to those contractors, consultants who completed the questionnaire used in this survey, for their generous Co-operation and contribution.

I would like to thank the staff of the college of engineering for their propositions, constructive comments and kind assistance

In addition I would like to thank my colleagues and friends because they never stopped believing that we would finish this work.

Finally, I would like to dedicate special thanks for my parents **Abdel Magid** and **Nour** for all the love and support they have given me and also for my brothers and sisters who encourage me always.

## **Abstract**

It has been lately observed that more and more construction companies are getting ISO – certification. However, there are no evidences to confirm any improvement in the construction process. This gives rise to some concerns about the usefulness of the ISO- certification and the problems and challenges that might accompany quality system implementation.

This study analyzed how the ISO 9000 framework could be employed in the construction industry in Sudan.

The main objectives of the research are to provide an overview of the ISO 9000 series and to investigate the influence of employing ISO 9000 series framework in the performance of construction companies in Sudan.

A literature review, mainly covering a very detailed overview of the ISO 9000 series, and their application in construction industry was carried out

To investigate the research problem, a two stages investigation was conducted. The first included personal instructed interviews and the second included the development of a questionnaire to survey the industry in order to gather the required information from some construction companies that are already ISO – certified.

The main conclusions were that many of the concepts contained in the ISO 9000 requirements were found by experience as being abstract or tended to be confused with one another or to be misinterpreted.

The key finding confirms that the application of ISO 9000 series requirements serves the function of improving the company's competitiveness and allowing the company to be more efficient.

The recommendations arising from this research are that there is a need to expand the culture of quality and to integrate ISO 9000 requirements as a dominating part of the whole construction process.



لقد لوحظ في الفترة الاخيرة ان هنالك زيادة كبيرة في عددية شركات البناء والتشييد الحاصلة على شهادة الجودة العالمية ( الايزو ) , ومع ذلك لا توجد ادلة كافية تؤكد حدوث تحسن في أداء عملية التشييد, الشئ الذي يثير بعض القلق بشأن جدوى اصدار هذه الشهادات بالاضافة للمشكلات والتحديات التي قد تصاحب تطبيق نظام الجودة .

في هذه الدراسة تم تحليل كيفية توظيف أطار نظام الجودة 9000 في صناعة التشييد في السودان . أن الاهداف الرئيسية من هذه الدراسة هو تقديم لمحة عامة عن سلسلة نظام الجودة 9000 والتحقق من تأثير نظام الجودة 9000 في أداء شركات التشييد في السودان . تطرقت الدراسة بشكل اساسى الى ادق التفاصيل لسلسلة نظام الجودة 9000 وتطبيقها في صناعة التشييد . تم استكشاف مشكلة البحث على مرحلتين , المرحلة الاولى مرحلة المقابلات الشخصية والمرحلة الثانية مرحلة الاستبيان وذلك للحصول على المعلومات المطلوبة من شركات التشييد الحاصلة . (على شهادة الجودة العالمية ( الايزو ) . أوضح البحث أن معظم المفاهيم الموجودة كمتطلبات في نظام . الايزو 9000 مختصرة ومتضاربة وغير مفسرة بطريقة واضحة ان الاستنتاج الرئيسى يؤكد ان تطبيق متطلبات سلسلة الجودة العالمية 9000 تساعد في تحسين القدرة التنافسية للشركة و . في جعلها أكثر كفاءة . يوصى البحث بان هنالك حاجة ماسة لرفع الوعى بثقافة الجودة ودمج متطلبات نظام الجودة 9000 في عمليات التشييد واعتبارها جزءا اساسيا ومؤثرا منها .

## **LIST OF TABLES**

### **CHAPTER TWO**

Table 2.1	the ISO 9000 Family of International Standards	13
Table 2.2	Comparison between ISO 9000 Principles and Business Excellence Principles	18-19
Table 2.3	the Reshaped Mind - Set	22
Table 2.4	Similarities of Three Managing Processes	22
Table 2.5	Assessment Questions (for Any Process in a QMS)	25-26
Table 2.6	ISO 9000 Registration in Relation to Malcolm Baldrige Award	26

### **CHAPTER FIVE**

Table 5.1	what is the company business?	85
Table 5.2	Positions in the company?	86

Table 5.3 what is the sector type you work for?

87

Table 5.4 How long have you been dealing with  
construction 88 projects?

Table 5.5 what is/are the size of project/s have you  
participated in? 89

Table 5.6 What is important for your company to be ISO  
certified? 90

Table 5.7 Are the reports of the activities and the  
development research sufficient enough to help the  
leadership to take its decisions? 91

Table 5.8: Which aspects of quality management are  
necessary to improve after getting the registration to  
implement ISO 9000 system? 92

Table 5.9 what are the systems of measuring the actual  
influence of quality for company  
performance. 93

Table 5.10 what is the mechanism of problems solving  
between  
the project shareholders?

94

Table 5.11 ISO 9000 implementation.  
96- 98

Table 5.12: The model of interpreting the agreement  
or disagreement between the Adherence to and importance  
of ISO 9001 requirement paragraphs 99

Table 5.13: The importance of ISO 9001.  
100-101

Table 5.14: Adherence to ISO 9001.  
102-103

Table 5.15: Ranking of the various ISO 9001  
104-105

requirement paragraphs.

Table 5.16 the Effects of ISO 9000 on company  
110-111

Performance

Table 5.17 The ranked the ISO 9000 requirements  
112

factors According to the Chi-square  
calculated

## **LIST OF FIGURES**

## **CHAPTER THREE**

Figure 3.1 Process model © 1986 Quality management international. 52

Figure 3.2 System Model Based QMS in ISO 9001:2000. 53

## **CHAPTER FIVE**

Figure 5.1: what is the company business?

85

Figure 5.2: Positions in the company?

86

Figure 5.3: What is the sector type you work for?

87

Figure 5.4: How long have you been dealing with  
construction 88 projects?

Figure 5.5: What is/are the size of project/s have you  
89

participated in?

Figure 5.6: What is important for your company to be  
90

ISO certified?

Figure 5.7: Which aspects of quality management are  
92

necessary to improve after getting the  
registration to

implement ISO 9000 system?

Figure 5.8: what are the systems of measuring the  
actual 93

influence of quality for company  
performance?

Figure 5.9: what is the mechanism of problems solving  
95

between the project shareholders

## **TABLE OF CONTENTS**

ACKNOWLEDGEMENTS

i

ABSTRACT (ENGLISH)

ii

ABSTRACT (ARABIC)

iii

LIST OF TABLES

iv-v

LIST OF FIGURES

vi

### **CHAPTER 1: INTRODUCTION**

**1.1. General**

2

1.2. Statement of the problem

2

1.3. Objectives of the research

2

1.4 Research Methodology

3

1.5 Research Layout

3

### **CHAPTER 2: ISO 9000 SERIES**

2.1 General

5



2.2	The standards	5
2.3	The ISO	5-6
2.4	goals of international standardization	6
2.5	The need for international standardization	6-8
2.6	The benefits of ISO standards for society	8
2.7	The development of ISO standards	9
2.8	Categories of ISO 9000 family of standards	10-13
2.9	The flexibility of ISO 9001: 2000	14
2.10	The membership of ISO	14
2.11	The processes of making the standard	15
2.12	The fields that ISO covered	15-16
2.13	The processes to become ISO 9001 certified	16-17
2.14	Alignment of principles with the Business Excellence Model	17-19
2.15	The Role of Continuous Improvement in ISO 9001.	20-22
2.16	Threats and Opportunities for the ISO 9000 family	23
2.17	Relation of ISO 9000 Standards to National Awards and to Total Quality Management (TQM)	23-24
2.18	Relationship of National Awards to ISO 9001.	24-26
<b>2.19</b>	<b>Requirements of applying ISO 9001</b>	<b>27-45</b>

## **CHAPTER 3: THE APPLICATION OF ISO 9000 IN CONSTRUCTION**

3.1	Introduction	47-48
-----	--------------	-------

3.2 Techniques at the Construction Site	48
3.3 Quality in construction	49-56
3.4 The Perspectives of the Parties Involved in a Construction Project	57
3.5 ISO 9001 Requirements for the Members of the Project	58- 66
3.6 The effectiveness of internal quality audits on ISO 9000	67 –73
3.7 The Improvement of the Construction Process in Sudan	74

## **CHAPTER 4: RESEARCH METHODOLOGY**

4.1 Introduction	76
4.2 Research Approach	76
4.3 Questionnaire Layout	77
4.4 Questionnaire Piloting	78
4.5 The survey sample	80
4.6 Statistic Tool for Analysis (Chi- square test)	81-82

## **CHAPTER 5: ANALYSIS AND DISCUSSION OF RESULTS**

5.1 Introduction	84
5.2 Questions related to the respondent's experience	84-89
5.3 Questions related to the ISO 9000 in the company.	90-95
5.4 Questions related to the ISO 9000 implementation	96-98
5.5 Adherence to and importance of ISO 9001 Requirement paragraphs.	99-109
5.6 Questions related to the Effects of ISO 9000 On company performance.	110- 112

## **CHAPTER 6: CONCLUSION AND RECOMMENDATIONS**

6-1 Conclusions	114- 118
6.2 Recommendations	119

6-3 Recommendation for Further Studies	120
--	-----

## **REFERENCES**

121-123

## **APPENDIXES**

124

APPENDIX A: Version 1 of the survey questions	125-131
APPENDIX B: Final version of the survey questions (in English)	132-138
APPENDIX C: Final version of the survey questions (in Arabic)	139-145