Causes of Contractors' Failures in Saudi Arabia

by

Adel Abdulaziz Al-Barrak

A Thesis Presented to the

FACULTY OF THE COLLEGE OF GRADUATE STUDIES

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DHAHRAN, SAUDI ARABIA

In Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE

In

CONSTRUCTION ENGINEERING AND MANAGEMENT

June, 1993

Order Number 1354034

Causes of contractors' failures in Saudi Arabia

Al-Barrak, Adel Abdulaziz, M.S.

King Fahd University of Petroleum and Minerals (Saudi Arabia), 1993

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

CAUSES OF CONTRACTORS' FAILURES IN SAUDI ARABIA

BY

ADEL ABDULAZIZ AL-BARRAK

A Thesis Presented to the

FACULTY OF THE COLLEGE OF GRADUATE STUDIES

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DHAHRAN, SAUDI ARABIA

In Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE
In

CONSTRUCTION ENGINEERING AND MANAGEMENT

JUNE 1993.

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DHAHRAN, SAUDI ARABIA

COLLEGE OF GRADUATE STUDIES

This thesis, written by ADEL ABDULAZIZ AL-BARRAK under the direction of his Thesis Committee and approved by all its members has been presented to and accepted by the Dean of College of Graduate Studies, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN CONSTRUCTION ENGINEERING AND MANAGEMENT.**

THESIS COMMITTEE

Dr. Sadi Assaf (Chairman)

23/6/93

Dr. Abdulaziz A, Bbshait (Member)

Dr. Ahmed Al-Gahtani (Member)

23/6

Department Chairman

Dean, College of Graduate Studies

4-7-93

Date

I dedicate this work to my brothers and wife for their continuous support and encouragement.

ACKNOWLEDGEMENTS

Acknowledgement is due to King Fahd University of Petroleum and Minerals for support of this research.

I wish to express my appreciation to Dr. Sadi Assaf who served as my major advisor. I also wish to thank the other members of my Thesis Committee, Dr. Abdulaziz Bubshait and Dr. Ahmed Al-Gahtani for their comments and suggestions.

Thanks are also due to all those who helped me in conducting this research.

THESIS ABSTRACT

NAME: ADEL ABDULAZIZ AL-BARRAK

TITLE: CAUSES OF CONTRACTORS' FAILURE IN SAUDI ARABIA.

MAJOR: CONSTRUCTION ENGINEERING AND MANAGEMENT

This thesis discusses the main causes of failure in the Construction industry in Saudi Arabia. A survey of 68 contractors from the entire Kingdom was undertaken. These contractors were classified by the Ministry of Housing and Public Works from grade one to four. The distribution of these contractors are as follows: 7 from grade one, 12 from grade two, 27 from group two, and 22 from group three.

The survey included 34 different causes of failure and their degree of importance. The severity factors of these causes were measured by their level of importance and were ranked according to the severity index for group one together, group two, and group three, and a combination of all respondents. A computer statistical package (SAS) was used to analyze the data.

A hypothesis that " grade one and two (group one), grade three (group two), and grade four (group three) generally agree on the ranking of severity indices" was tested and shown to hold true. It was concluded that lack of experience in the line of the work, neglect, poor estimation practices, bad decisions in regulating company's policy, and national slump in the economy are the most severe factors. Also, it was noted that grade three contractors give the most response, followed by grade four and then grade one and two. This reflects the true awareness of causes of failures among contractors.

MASTER OF SCIENCE DEGREE
KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
DHAHRAN, SAUDI ARABIA.
JUNE 1993.

TABLE OF CONTENTS

Chapter	Title	Page
	ACKNOWLEDGEMENT	III
	ABSTRACT	IV
	TABLE OF CONTENTS	V
	LIST OF FIGURES	VIII
	LIST OF TABLES	IX
CHAPTER 1	INTRODUCTION	1
1.1	GENERAL	1
1.2	PROBLEM BACKGROUND	2
1.3	OBJECTIVES OF THE STUDY	3
1.4	LIMITATION OF THE STUDY	6
1.5	THE SIGNIFICANCE OF THE STUDY	6
1.6	THESIS ORGANIZATION	7
CHAPTER 2	CAUSES OF FAILURES	9
2.1	GENERAL	9
2.2	PREVIOUS STUDIES	9
2.3	CAUSES OF FAILURES IN QUESTIONNAIRE	14
2.3.1	*MANAGERIAL CAUSES*	*14*
1	*Lack of Experience in the line of Work*	*14*
2	*Replace Key Personnel*	*15*
3	*Assigning Project Leader in the Site*	*16*
4	*Labor Productivity and Improvement*	*17*
5	*Bad Decisions in Regulating Company Policy*	*18*
6	*Use of Project Management Techniques*	*19*
7	*Company Organization*	*20*

8	Procurement Practices	23
9	Claims	24
10	Internal Company Problems	24
11	Recruitment from one Country	25
12	Recruiting Multinationality	25
13	Owner's Absence from the Company	26
14	Using Computer Applications	26
15	Frauds	27
16	Neglect	27
2.3.2	FINANCIAL CAUSES	28
1	Low Margin Profit due to Competition	28
2	Cash Flow Management	30
3	Bill and Collecting Effectively	31
4	Poor Estimation Practices	32
5	Evaluate Project Profit in one Fiscal Year	33
6	Employee Benefits and Compensations	34
7	Controlling Equipment Cost and Usage	34
2.3.3	EXPANSION CAUSES	35
1	Expanding into New Geographic Locations	36
2	Opening a Regional Office	37
3	Increased Number of Projects	38
4	Increased Size of Projects	39
5	Change in the Type of Work	40
6	Lack of Managerial Maturity	41
7	Changes from Private to Public or Vice Versa	43
2.3.4	ENVIRONMENTAL CAUSES	44
1	National Slump in the Economy	44

2 *Construction Industry Regulation in Saudi Arabia* *45*

3 *Owner Involvement in Construction Phase* *45*

4 *Bad Weather* *46*

2.4 SUMMARY 49

CHAPTER 3 DESCRIPTION OF THE SURVEY 50

3.1 QUESTIONNAIRE DESIGN 50

3.2 STATISTICAL SAMPLING 51

A. *Sample Size* *51*

B. *Scoring* *57*

3.3 SUMMARY 59

CHAPTER 4 FINDINGS AND RESULTS 60

4.1 STATISTICAL METHODS 60

4.1.1 *Tabulation, and Cross Tabulation* *60*

4.1.2 *Statistical Techniques* *70*

4.1.3 *Correlation* *72*

4.1.4 *Ranking* *76*

4.2 STATISTICAL RESULTS 86

4.2.1 *Coefficient of Variation* *86*

4.2.2 *Cross-Tabulation* *86*

4.2.3 *Correlation* *88*

4.2.4 *Test of Hypothesis* *88*

Test of the Correlation *89*

4.3 MAJOR FINDINGS 90

1 *Lack of Experience in the Line of Work* *92*

2 *Neglect* *92*

3 *Poor Estimating Practices* *93*

4 *Bad Decisions in Regulating Company Policy* *93*

5 National Slump in the Economy....94

6 Labor Productivity and Improvement....94

7 Owner Absent from the Company....95

8 Collecting and Managing Cash Flow....95

9 Lack of Managerial Maturity....96

10 Replacement of Key Personnel....97

11 Assigning Project Leader in the Site....97

12 Low Margin of Profit Due to Competition....97

13 Construction Industry Regulations in Saudi Arabia....98

14 Other Causes Specified and Comments....98

4.4 SUMMARY....99

CHAPTER 5 SUMMARY, CONCLUSION AND RECOMMENDATIONS....100

5.1 A SUMMARY OF THIS RESEARCH....100

5.2 CONCLUSIONS....101

5.3 RECOMMENDATIONS....103

5.3.1 General Recommendations....103

5.3.2 Recommendation for Future Research....104

REFERENCES....105

APPENDICES....108

APPENDIX-I....109

QUESTIONNAIRE....109

APPENDIX-II....118

FREQUENCIES....118

VITA....127

LIST OF FIGURES

	Title	Page
Figure 1.1	Development of Gross Loans Granted at the Level of Financial Institutions	4
Figure 1.2	Building Permits Issued by Municipalities	5
Figure 1.3	Thesis Organization	8
Figure 2.1	Causes of Business Failures	11
Figure 2.2	Type I Failure	12
Figure 2.3	Type II Failure	12
Figure 2.4	Type III Failure (Argenti, 1976)	12
Figure 2.5	Chain Versus Circular Organization Structure	21
Figure 2.6	Organization Chart	22
Figure 2.7	Effects of Temperature and Relative Humidity on Productivity (Oglesby et al, 1989)	48
Figure 4.1	Statistical Methods	61
Figure 4.2	Cross Tabulation of All Activities of Each Tested Groups	63
Figure 4.3	Cross Tabulation of the Experience of Each Tested Group	65
Figure 4.4	Cross Tabulation of Annual Construction Volume of Each Tested Group	67
Figure 4.5	Cross Tabulation of the Number of Workers of Each Tested Group	69
Figure 4.6	Scoring Scale	72
Figure 4.7	Spearman Correlation Values	77
Figure 4.8	Partial Correlation Values	78
Figure 4.9	Multiple Correlation Values	79
Figure 4.10	Ranking of Each Tested Group and all contractors for Managerial Causes	84
Figure 4.11	Ranking of Each Tested Group and all contractors for Financial, Expansion and Environmental Causes	85
Figure 4.12	The Percentage of Each Type of Causes	91

LIST OF TABLES

	Title	Page
Table 2.1	Profit Margins of Average Contractors in U.S.A. (Adrian, 1982)	29
Table 3.1	Fields & Activities Of Classifications	52
Table 3.2	Financial Limits for Classification Grades- Saudi Contractors	54
Table 3.3	Financial Limits for Classification Grades- Foreign Contractors	55
Table 3.4	Sample Size Information.	56
Table 4.1	Cross Tabulation of All Activities for Each Contractor of Each of the Tested Groups	62
Table 4.2	Cross Tabulation of the Experience of Each of the Tested Groups.	64
Table 4.3	Cross Tabulation of the Annual Construction Volume in SR million of Each of the Tested Groups.	66
Table 4.4	Cross Tabulation of the Number of Workers in Each of the Tested Groups	68
Table 4.5	Statistics of All Contractors	71
Table 4.6	Spearman Rank Correlation	73
Table 4.7	Rank Correlation Values	76
Table 4.8	Grade One and Two Contractors (Group One)	80
Table 4.9	Grade Three Contractors (Group Two)	81
Table 4.10	Grade Four Contractors (Group Three)	82
Table 4.11	All Contractors	83
Table 4.12	T- Values for Testing H_o	90

خلاصة الرسالة

الاســـم : عادل عبدالعزيز أحمد البراك

العنـــوان : الأسباب المؤثرة في فشل المقاولين

التخصص : هندسة وإدارة التشييد

التاريـــخ : محرم ١٤١٤هـ

يستعرض هذا البحث الأسباب الرئيسية المؤدية إلى فشل المقاولين في المملكة العربية السعودية . وقد شمل الإستبيان ٦٨ مقاولاً من جميع أنحاء المملكة والمصنفين لدى وزارة الإسكان والأشغال العامة من الدرجة الأولى إلى الرابعة. وكان توزيع المقاولين على النحو التالي : ٧ من الدرجة الأولى و ١٢ من الدرجة الثانية و ٢٧ من الدرجة الثالثة و ٢٢ من الدرجة الرابعة .

هذا وقد اشتمل البحث على ٣٤ سبباً تؤثر على فشل المقاولين . وقد رتبت هذه الأسباب حسب أهميتها وطبقاً لروية كل من مقاولي الدرجة الأولى والثانية معاً ومقاولي الدرجة الثالثة ومقاولي الدرجة الرابعة ، وكذلك رتبت هذه الأسباب لرؤية جميع المقاولين المشاركين في الدراسة. وقد حللت نتائج هذا البحث بواسطة الحاسب الآلي .

وقد ركزت الدراسة على أهمية مدى التوفيق في رؤية كل من المقاولين لمدى تأثير هذه الأسباب على فشل المقاولات . واستنتج الباحث أن قلة الخبرة في مجال العمل والإهمال وضعف في تقنية تقدير المشاريع والقرارات الخاطئة في تنظيم الشركة والهبوط في الحالة الاقتصادية من أهم الأسباب المؤدية إلى فشل المقاولين .

هذا وتميزت إجابة مقاولي الدرجة الثالثة بالتوافق ومن ثم مقاولي الدرجة الرابعة وأخيراً مقاولي الدرجة الأولى والثانية . وهذا يعكس مدى تأثرهم بهذه الأسباب .

درجة الماجستير في العلوم

جامعة الملك فهد للبترول والمعادن

الظهران - المملكة العربية السعودية

محرم ١٤١٤هـ

CHAPTER 1

INTRODUCTION

1.1 GENERAL

The construction business has very high risks. These risks, which could lead to failure, come from the sensitivity of the business to economic cycles, and from high levels of competition. Because there are large numbers of contractors, it is easy to establish a new firm. Since the entry into the construction business is easy, implementation could easily be poor and unorganized, which increases the probability of a contractor's failure.

In construction, there are three parties involved, namely, owner, consultant, and contractor. The relationship between these parties is adversarial because each party has goals which conflict with the other parties' goals. For example, the owner wants his project to be of a good quality and low cost, but this will reduce the profit of the contractor. The consultant wants the project to be safe and attractive which could cause both the contractor and the owner extra expenses. Also, the laborers hired by the contractor want their salary to be higher, which is not possible given the competitive prices in the construction business. The relation among parties could be a major source of a contractor's failure.

There is no exact definition of the contractor's failure, however, it could be defined as when a business:

1. ceases operation following assignments due to the inability to continue construction;

2. goes into bankruptcy due to failure of collecting money from customers;

3. voluntarily withdraws because of dissatisfaction with business or profit.

The construction industry attracts many people because of their belief of high profit, but when they enter the business, they will feel the difficulty and complexity of it.

Therefore, there are many contractors, but if the successful and profitable contractors are counted, they will be few.

1.2 PROBLEM BACKGROUND

During the boom years which were from 1975 to 1983, when the demand of oil increased, Saudi Arabia increased its oil export from 4 million in 1975 to 10 million barrels in 1983. Consequently, Saudi Arabia's income increased from SR 41,705 million in 1974 to SR 368,001 million in 1983, which was the peak. The increase in income resulted in an increase in expenditure in all sectors. The government established two banks and three funds to give loans without interest to support all types of business. The two banks are Saudi Credit Bank, and Saudi Arabia Agricultural Bank. The three funds are Saudi Industrial Fund, Real Estate Development Fund, and Public Investment Fund. Because of the availability of money, investment was in every sector. The construction industry enjoyed a large share in the economic boom. The number of projects offered were so large that the number of contractors increased and each contractor could have as many projects as he wanted. Although the formation of many of these contracting businesses had no solid basis, they were able to do business and make profit.

After the international recession started in mid 1983, the Saudi market was affected. The recession had more influence in the construction industry because of a reduction in oil

income, which affected the offering of large projects and loans. Also, most of the large projects had already been executed. Consequently, the competition was much tougher, and standards became higher. As a result of these factors, many contractors were exposed and some of them changed their business and some left the business altogether.

Figure 1.1 shows the development of gross loans granted at the level of financing institutions from 1394 A.H. to 1410 A.H. Figure 1.2 shows the number of construction permits issued by the municipalities from 1394 A.H. to 1411 A.H. The two figures show the change in the construction and loans during the boom and depression years which have been affected by oil production.

1.3 OBJECTIVES OF THE STUDY

The main objectives of this thesis are as follows:

1. To undertake a comprehensive analysis of the most important factors that cause business failure among contractors.

2. To identify and analyze the most severe factors causing contractor's failure in Saudi Arabia.

3. To test the hypothesis that different grades of contractors, generally agree on the severity of failure.

4. To write a conclusion and recommendations.

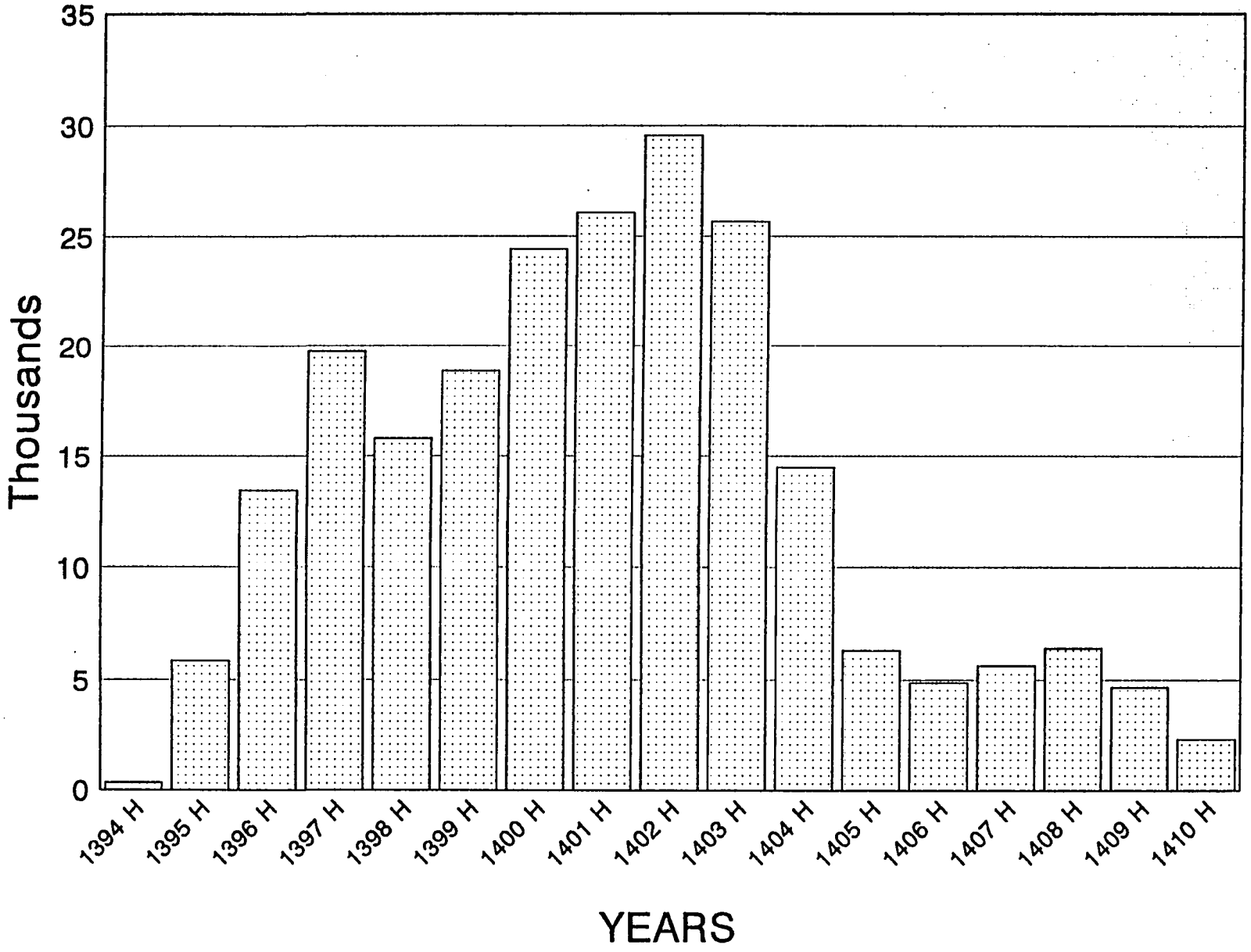


FIGURE 1.1 DEVELOPMENT OF GROSS LOANS GRANTED LEVEL OF FINANCING INSTITUTIONS SR MILLION
(SAUDI MONETARY AGENCY)

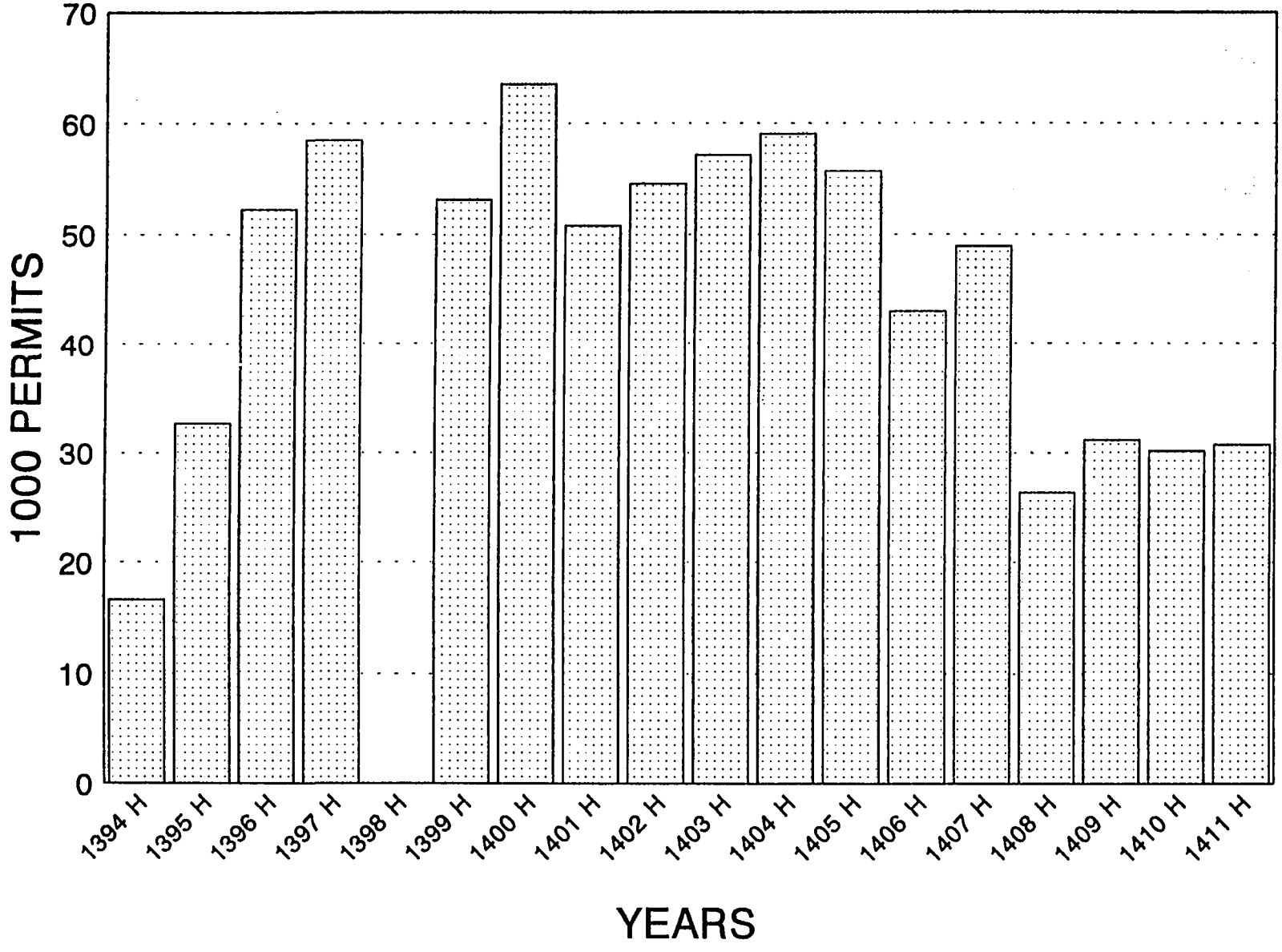


FIGURE 1.2 NUMBER OF BUILDING PERMITS BY MUNICIPALITIES
(MINISTRY OF MUNICIPALITIES, 1410)

1.4 LIMITATION OF THE STUDY

This study is limited to building and highway contractors who are qualified and registered in the Ministry of Housing and Public Works as of 25th. of Muharam, 1413H. The contractors will be from grades one to four in Saudi Arabia.

The technical failure of projects will not be covered in this study. The study will be restricted to construction phase.

1.5 THE SIGNIFICANCE OF THE STUDY.

The number of competitors in the construction business is much higher than in any other business. As a result, construction business is exposed to failure more than any other business. Therefore, the construction business should be studied to determine the causes of failures. The past period proves that there are causes which should be avoided in order to reduce the number of failures.

It is true that the contractor has the largest share in the causes of failure. However, there are other causes which are out of the contractor's control. For example, delay in progress payment, a national slump in the economy and government regulations. This study will examine these causes and their degree of severity. The construction business in general consumed 49.6% and 32% of the total government expenditure during the 1970-1975 plan and the 1975-1980 plan respectively. This gives construction a very high degree of importance in the government. This business must have strong regulations to control it; as a result, money will be saved for the government. This study will determine the important causes which need more attention. In 1982, the government issued a new regulation which required consulting office supervision for each building. It was a good regulation, but the consultant office fee was very high, which added new cost to the building. Many owners

complained, then it was cancelled for less than 4 storey buildings. This regulation should be studied in all aspects to be fair to all parties. If this regulation could be reinstated, it would reduce problems.

The construction business requires more attention to remedy the weak points. This is what the study investigated.

1.6 THESIS ORGANIZATION

This thesis discusses the construction industry and the associated problems which lead to contractor failures. It was found that causes of contractor failure are considered to be an important field of study for future improvement in the construction industry and need further detailed studies. This thesis is divided into five chapters and an appendix.

Chapter 1 is intended to give the reader an overview of the construction industry in the Kingdom of Saudi Arabia, to discuss present and previous studies conducted into the causes of contractor failure, and to discuss the significance of the study. Chapter 2 discusses the causes of contractor failure.

Chapter 3 presents a detailed survey of contractors. It also includes the research methodology and sampling techniques used to measure the severity indices of major causes of failures. The fourth chapter is devoted to statistical methods used, tables and information deduced from statistical analysis and the statistical results and interpretation of these tables and information. It also contains the ranking by severity index of the causes of contractors failures by group one, group two, and group three. A hypothesis is set up and tested that the different grades generally agree on the severity rank of causes of failures. Chapter 5 is devoted to a summary, conclusions and recommendations for further studies. Figure 1.3 shows a chart of the organization of the thesis.

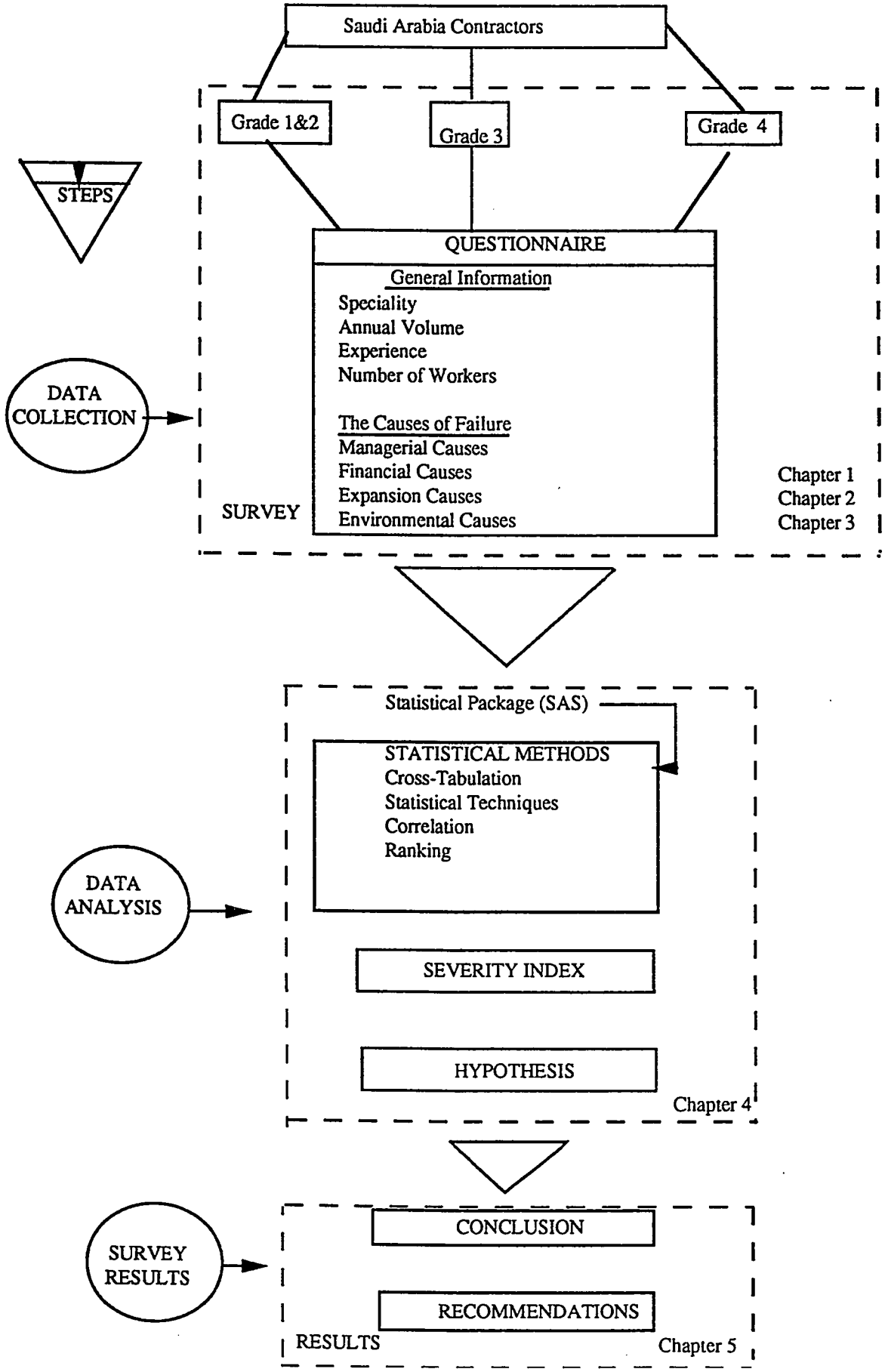


Figure 1.3 Thesis Organization

CHAPTER 2

CAUSES OF FAILURES

2.1 GENERAL

The causes of construction business failure are varied from a country to country and even from city to city, because of economic, social, and competitive situations of the area and the government regulations. In addition, the causes may vary from one type of construction to another, for example, the cause of highway construction is not the same for residential construction.

2.2 PREVIOUS STUDIES

Business failure in construction does not have much written about it. It has been stated that "Unlike the study of how to succeed in business, the study of business failure has not been given attention" (Kungari, 1988).

Dun and Bradstreet Corp. is a private corporation that maintains a data base on failure in the construction industry (Kungari, 1988). They identified five important causes of business failure in the construction industry as follows:

1. Bad profits
2. Inadequate sales
3. Management incompetence and lack of experience
4. Loss at market and economic decline, and

5. Difficulty collecting from customers.

The relative weight of 10 major causes of business failures which are identified by Dun and Bradstreet are shown in Figure 2.1. Since the economic factors account for 69.8% of all failures, and bad profits account for 74.2% of the failures in the economic factors category, it can be said that bad profits accounts for 51.8% of all failures.

In his book, John Argenti (1976), stated some causes of failure as follows:

1. Poor management
2. Neglect of accountancy information
3. Company does not respond to change
4. Powerful constraints
5. Overtrade
6. Financial problems
7. Normal business hazard.

Three types of business failure are listed in the book. The first type is when a company gains a very low profit, which never rises above "poor before failure". Figure 2.2 shows this path. The second type happens to very young companies (average 10 years). The company is making profit upwards to "fantastic" heights before crashing down again. Figure 2.3 shows this path. The third type is more complex. These companies were making good profit for years, but a partial failure took place. This failure is followed by a plateau after which there is a rapid decline to insolvency. Figure 2.4 shows the path. (Argenti, 1976)

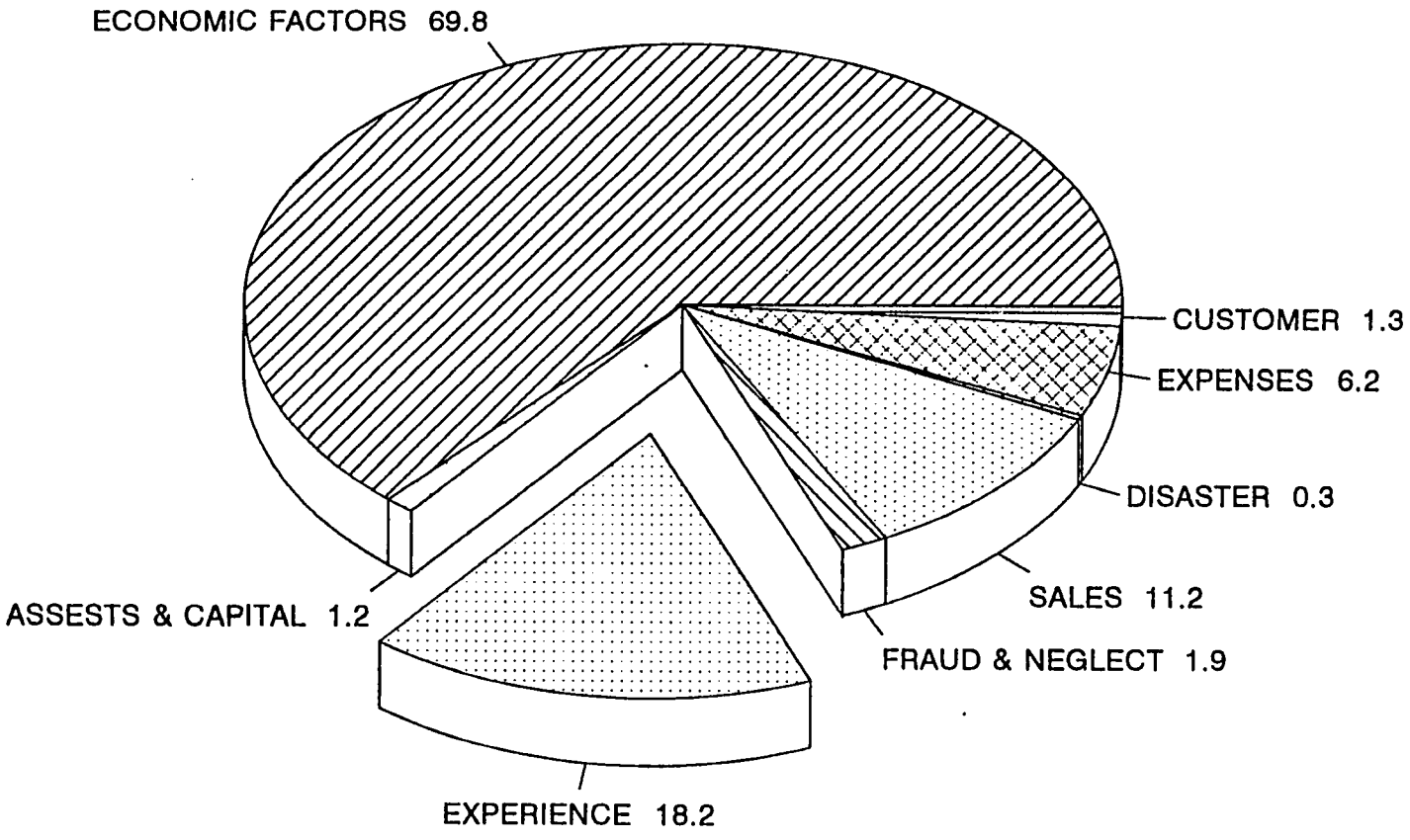


FIGURE 2.1 CAUSES 0F BUSINESS FAILURES (KANGARI,1988)

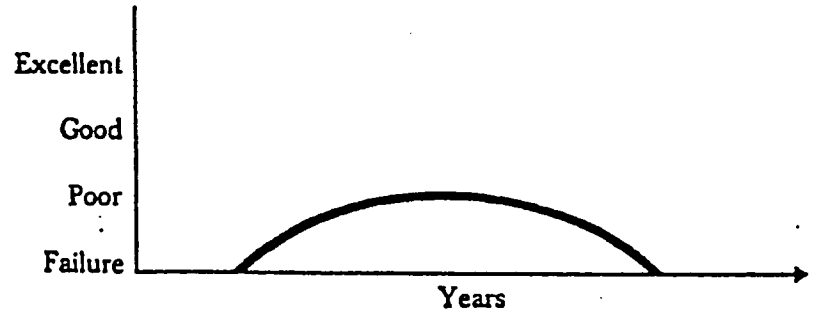


Figure 2.2 Type I Failure

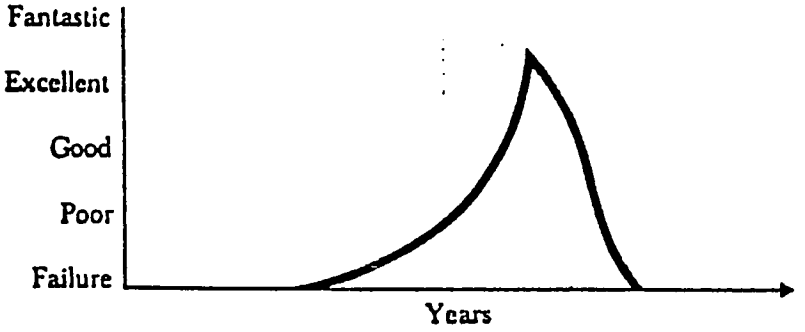


Figure 2.3 Type II Failure

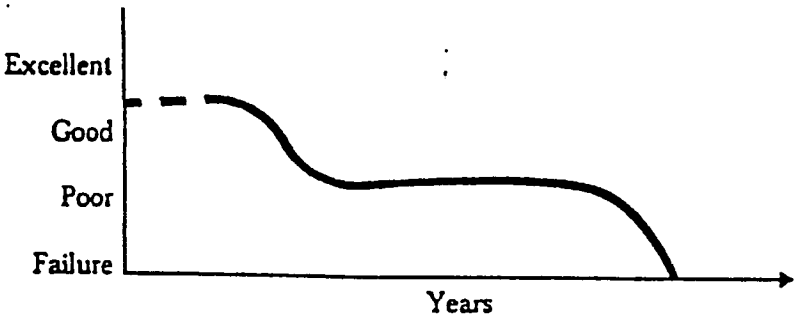


Figure 2.4 Type III Failure (Argenti, 1976)

Thomas C. Schleifer (1989) identified 10 causes of construction business failure. The first five are related to business strategies, and the second five are related to accounting considerations.

They are as follows:

1. Increasing project size
2. Expanding in unfamiliar locations
3. Replacing key personnel
4. Moving into new construction
5. Not maturing in management as business expands
6. Using poor accounting systems
7. Evaluating project profit incorrectly or not in time
8. Not controlling equipment costs
9. Not billing or collecting effectively
10. Jumping between computerized accounting systems.

Turkistani (1990), distributed the questionnaire to 28 contractors and 15 legal accountants in the Eastern Province. The subject was the causes of business failure among Saudi contractors. He found 84.4% degree of agreement among contractors and legal accountants. The most important causes, from the contractors' and legal accountants' view

points, are bad judgement, difficulty in acquiring work due to excessive competition and lack of managerial experience, and lack of experience in the firms' line of work.

2.3 CAUSES OF FAILURES IN QUESTIONNAIRE

These causes which are included in the questionnaire are divided into four groups, namely, managerial, financial, expansion, and environmental causes. These causes are as follows:

2.3.1 MANAGERIAL CAUSES

The managerial causes include important causes which have strong influence in the contractors failures. Lack of experience in the line of work, bad decisions, and company organization could be important factors in the failures. Some of these causes could be part of others. For example, frauds will increase in low experience management and unorganized company. The managerial causes will be as follows:

1 Lack of Experience in the line of Work

"Experience is the knowledge or skill gained by observing, doing, or living through things" (Thorndike and Burnhart, 1979). When contractor is doing the same type of work for many years, this experience gives him a competitive edge in the market.

The management is the key for the success of the company. The owner should employ high degree of qualified working team in the company. The working team also must have good experience in the same line of work. Therefore, the management would be able to maximize the usage of the company's resources. Not only working team has experience, but also the owner should have experience in the line of work for two reasons. First, the owner would not be cheated from any one inside or outside the company. Secondly, if the owner does not have experience, he may not appreciate any improvement or any new ideas

which could bring good income in the future. Most of the decisions which cause contractors failures are taken by the management.

During the past year, if a contractor survived mistakes, corrected them and learned from them, then he acquired additional knowledge that his competitor might not have. A contractor must have good information systems to get enough benefit from previous projects. This will help him in estimating, planning and managing future projects. Also, the more experience a contractor has in the work, the more information could be available and comprehensive. Dun and Bradstreet stated that the lack of experience, accounts for 18.2% of all failure moratorium (Kungari, 1988).

2 *Replace Key Personnel*

The three main functional areas of construction business are getting the work, doing the work and managing the business. The responsibility of each functional area differs from one company to another. One person could be responsible for all functional areas or two people share the responsibilities. If the construction business is making a profit, the efforts of individuals who are responsible for functional areas will be the key for success. Loosing one of these key persons will put the company immediately at risk until his replacement proves that he can run the work for a profit.

There are many things that could happen to the company because of loosing any key person. If the company looses construction operation manager, it will change because the quality of work of the field manager depends on him. Sometimes, the company may make a profit because of his experience in planning the work, delegation of authority, dealing with customers, and managing the labor force. If a company looses an estimating and sales manager, it will be at risk, this is because of his experience in preparing bids and attracting customers that eventually make profit for the company. This situation will be the same in

the area of administration and accounting. If an administration or accounting manager leaves the company, it will loose his experience in maintaining a good cash flow, preparing more accurate evaluation and having a continued knowledge of his bank balance. A new person needs three to six months to be familiar with company's policies and regulation, with the new staff and the company's customers. The amount paid for learning period is not recognized by many contractors. The less experience in the type of work for the new key person is, the more risk the company will be exposed to. Construction business which is difficult at best requires a unique person or group of people to construct for making a profit and any replacement in that group is like starting from the beginning. (Schleifer, 1990)

In order to put the company in the safe side, there must be two relief persons for each key person. Also, a contractor must keep minutes of all meetings, confirm things in writing and keep all documents related to the business. This information will help the new replacement in the future work.

In the end, the most common cause of construction business failure is inadequate replacement of personnel responsible for one of the primary functional areas.

3 *Assigning Project Leader in the Site*

The size of construction company determines the project leader. The project leader could be a project manager, project engineer, resident engineer or a site engineer. Project leader should be qualified for the job because he is the vehicle for reaching project goals.

"A successful project results when the personality and the leadership ability of the project manager is matched with the right project team in the proper project situation." (Cori, 1987).

The three major criteria for evaluating a project leader are attitudes, knowledge and skills. Attitudes can not be created but they can be strengthened by experience and attending courses. The project leader should have a strong desire to manage, a strong capacity for empathy, and strong need for power. Knowledge can be divided into academic and practical. Project leader must be an engineer or at least a graduate, beside his degree he should be assigned to fields which are related to his work or major. This system is applied in Saudi ARAMCO. Every new graduate must be enrolled in the Professional Development Program (PDP) which is three years. During the three years, the graduate will be assigned to various departments according to his major and job requirements. Skills are the third criteria, which can be developed through on-the-job training.

The leader should be an inspiring leader, for example, who encourages, appreciative, wants loyalty and is fair. The company must assign the right man in the right place to assure that project will succeed.

4 Labor Productivity and Improvement

Productivity can be defined as the rate of production or the amount of goods and services that are produced by productive factor in a unit of time. "Productivity of construction producing resources to include labor and equipment is dependent on numerous factors, including uncontrolable weather, worker moral, and management supervision" (Adrian, 1982). Since, there is a direct relation between productivity and cost, productivity is not only very important term to a contractor but also it is the key to success or failure. Most contractors complain from slow productivity but none of them determine the reasons and create the solutions. There are many tools that can be used in productivity, for example, work sampling, questionnaires and interviews, five-minute rating, and foreman dely survey. Also, there are tools for improving productivity, such as quality circle, crew

balance chart, and recording. These methods can identify the problem and introduce the solution to improve productivity.

In construction, labor is very important because of the following reasons. First, labor is needed in almost every construction activity and he can not be substituted. Secondly, he constitutes a large portion of the construction input. Thirdly, he is a major determinant of activity of productivity. Finally, he is high variability and most susceptible to improvement (Drewin, 1982). Therefore, a contractor should improve his labor moral by using the most applicable program because people might be motivated by money, or social needs, or positions. There are many elements to be considered in designing motivating programs. The program should be cover as much labor as possible. The financial compensation has to be guaranteed in hourly wages or bonus proportional to salary. The program must be strongly related to performance measures which is specific and done periodically. A low productivity can be a fatal cause of contractor's failure.

5 *Bad Decisions in Regulating Company Policy*

Most contractors believe that the only reasons for failure are labor problem, inflation, high costs of equipment, and tightening of market. Although there are contractors who are exposed to the same factors but they are making profits. They do not know that they may contribute to failure due to bad management decisions. These management decisions might not cause failure directly but they lead to failure. For example, management decided to bid in project which was four times the largest project has ever executed, the company completed the project with loosing which caused the company to weaken and subsequent failure.

Decisions in regulating the company policy should not be taken unless all significant factors involved not only be considered but also handled in an accurate and correct manner,

so that the results will be satisfactory from all view points. Contractor could avoid this factor by hiring consulting office or full time consultant. Consulting office or consultant should be chosen according to the previous experience with the work qualifications and capabilities.

6 *Use of Project Management Techniques*

Project management is the integral of all of the construction project functions which include coordination of subcontractors, scheduling, cost control, labor relation, billing, purchasing, expending, and other functions related to the project. In construction company, project manager is in charge of these functions.

Adrian (1976) stated that "a large number of contractor business failure can be traced to the disuse of proven business practices" (Adrian, 1976). The business practices which is necessary for everyday business vary from a company to another, because they depend on the size of the company and the type of work the company performs. Also, a company's competition, and the economic environment in which the firm is operating, have influence in the various projects. The variety of practices for each company will not remove the company from common business skills, such as marketing, personnel management, finance and cost control, which are fundamental for profitable business. Modern management practitioners commonly divide the management process into the four functions of planning, organizing, directing, and controlling. The planning is the most important function in the company's business operation. Also, the directing and controlling are equally important in regard to contractor's objectives.

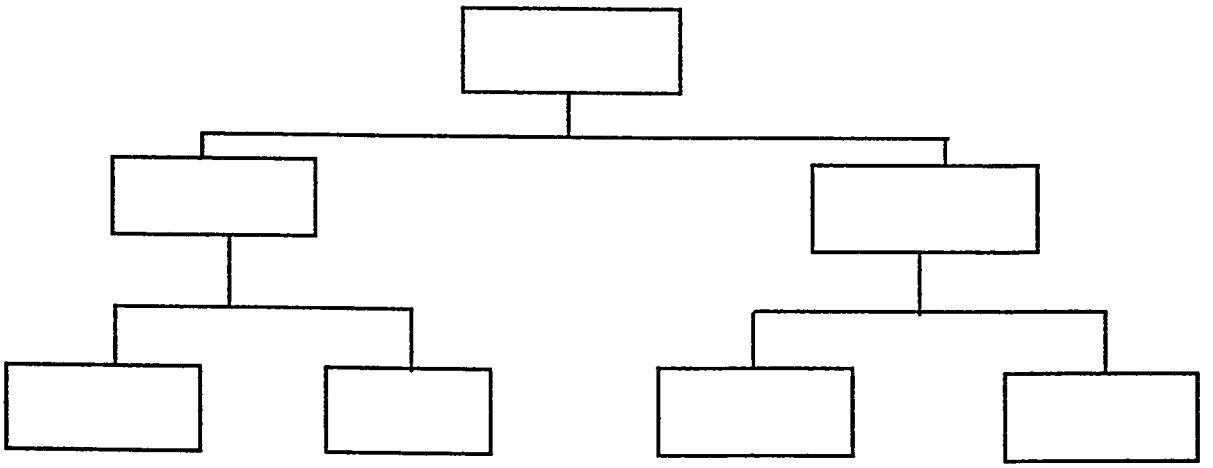
The use of project management techniques is very important in the construction industry, because the coordination and use of the many types of labor, skills, materials,

and equipments which are used in construction, require daily application of proper project management techniques.

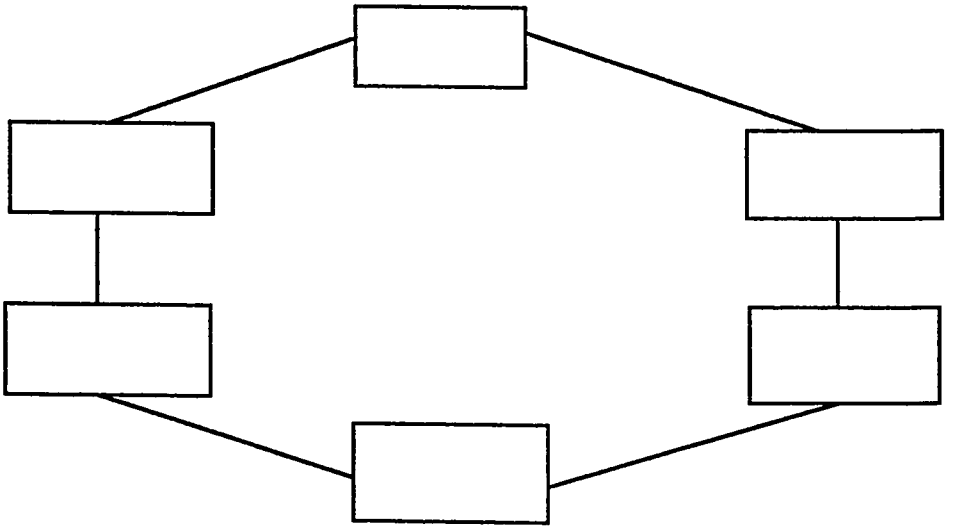
7 Company Organization

The organization of company is very important to do the work efficiently. The organizational structure depends on two factors. The first is the type of contractor and the second is the size of company. However, the main structure is common between all contractors. The more common classification of contractors is according to the type of work performed. So, the type of contractors are residential, commercial, and highway. The performing of organizing function requires a preparation of organizational chart which determines the grouping of activities, the authority relationships, and the communication channels between groupings. There are two types of charts, namely, chain and circular, as shown in Figure 2.5. The decision making in the chain is centralized by an individual or small groups of individuals, where in the circular structure emphasizes decentralization. The communication in the chain structure is faster and more accurate than the chain structure.

The typical structure of organization chart for the small size firm, medium sized firm, and large sized firm are shown in Figure 2.6 In the small sized firm, the decision is centralized and the owner does most of the work. So, the basis is weak, and the business success depends on the owner.

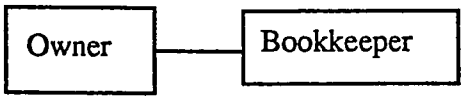


Chain

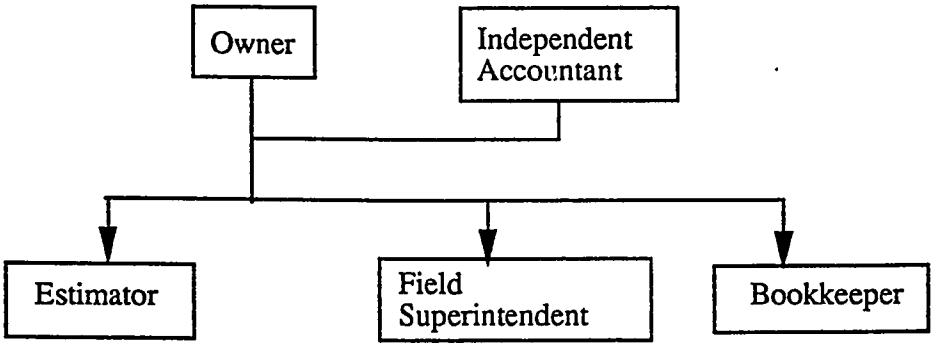


Circular

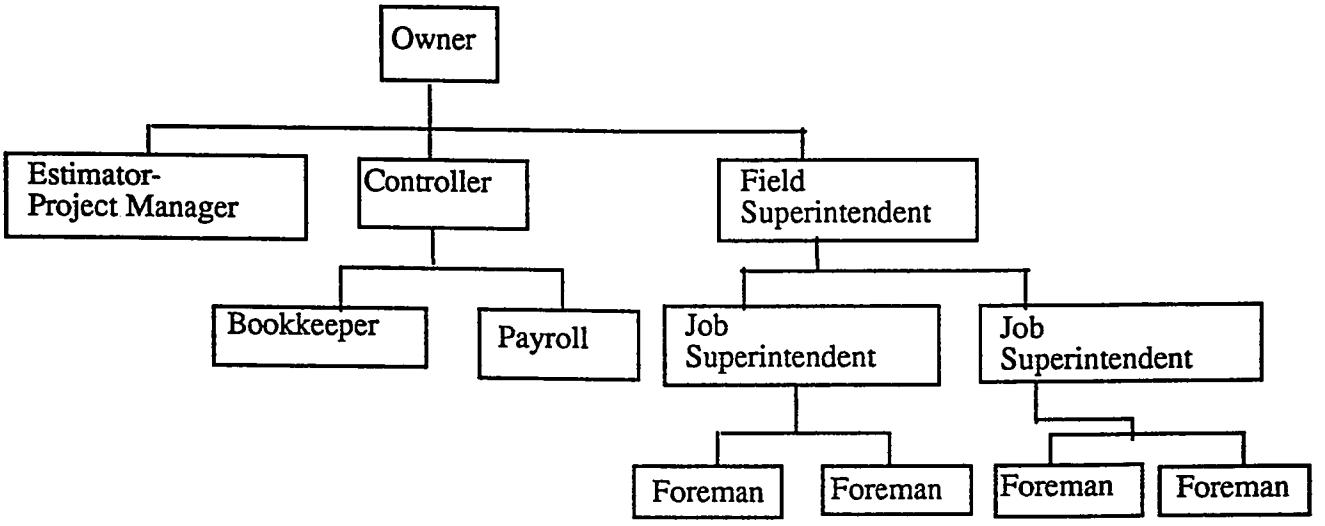
Figure 2.5 Chain versus circular organization structure. (Adrian, 1976).



Organization chart- samll sized firm



Organization Chart- Medium sized firm



Organization Chart- large sized firm

Figure 2.6 Organization Chart (Adrian, 1976)

Both the medium and large sized firms have three functions, namely an estimator, a field superintendent, and a book keeper. The medium firm has an independent accountant, but the large firm has a permanent accountant.

Although, the three functions overlap and intersect, they must be treated separately. Also, the responsibility and authority for each party in the organization chart must be clearly recognized. The lack of assigning the responsibility and authority for each party will delay the work, because of the conflict between these parties. So, if the company is well organized, the contractor can manage the construction without problems. This will reduce the chances of failure.

8 Procurement Practices

Construction materials can be purchased by two procedures, either purchasing directly, or purchasing for entire lump sum contract. The direct purchasing is better because it could protect material from problems associated with theft, misplacement, and damage, and save the cost of storage. However, purchasing materials before due time is very important in the construction, because the delay in purchasing will delay the completion date, and interrupt the schedule. Consequently, the contractor will be exposed to penalty which might sometimes cause contractor to fail. The latest information about new products should be provided to users to give him opportunity to choose the best. Purchasing is responsible to update equipment cost used in calculating the replacement costs.

In the open country like Saudi Arabia, purchasing material with good quality and reasonable price is not an easy task. It is because there are variety of trade marks for each item. For single item, price can be triple. In each construction company, it is recommended to have material specialist who can read specifications and decide the reasonable materials required for the company.

9 Claims

Contractors need to recognize the risks of disputes and try to minimize them for two reasons. First, the costs associated with them, secondly, the contractor's name in the market will be destroyed. The contractor should quit the claim, even though he missed some of his rights, because the owner will complete his building and will disappear from the market, but the contractor will stay.

The increase in the project size and working in unfamiliar areas can be reasons for disputes. When disputes do arise, contractor should respond quickly. The contractor should deal directly and fairly with involved parties before the dispute expands, and should limit the dispute to original issue or issues.

Construction industry will be exposed to many claims, if there are no planning, controlling and directing, because construction has many involved parties (owner, consult office and government), things must be done in the same time and too many materials are required in construction. Claims can cause the contractors completely running out of work.

10 Internal Company Problems

Most employees of contractors in Saudi Arabia are multinational. Each employee will have more loyalty to his nationality and will not prefer to work with another nationality which could cause problem in preparing schedule. Also, the problems between partners will have bad effect in the company because many employees will use this problem to their benefit. Also, this problem will resist any improvement. The importance of strong management will reduce the internal company problems, which could cause failure if it is not controlled and treated carefully.

11 Recruitment from one Country

In Saudi Arabia, almost all construction contractors depend on the foreigners. There are contractors who depend on certain nationality which could cause failure in many cases. Workers from one country can build strong interrelation which causes problem to contractors. For example, employees will hide errors for others. Also, workers will refuse any orders which are not in their advantage. Government might take decision for political reasons to stop recruitment and get rid of workers which contractor depended on. This problem will cause contractor to change his workers and to be familiar with the new nationality.

On the other hand there are many advantages in controlling certain nationalities. Workers will understand each other because they speak one language, however, in some countries, there are many languages which make communication difficult. Contractors will have less friction between employees from one country compared with contractor who have multinationality labor.

12 Recruiting Multinationality

Most contractors prefer to recruit multinationals without understanding the problems behind this decision. Even though, recruiting from more than one country can create competition between employees, there are problems that can be encountered. The most difficult problem are wages. Each country has its own economic standing which affects the wages of that country. For example, a mason from India may earn SR 600, and Philipines SR 900 salary, even though a mason from India with SR 600 may work better than Philipino with SR 900 salary. This salary is not related to quality or quantity of work. Consequently, the Indian mason will not work hard, because his peer earns more than him.

Recruiting multinationality in one company may create friction which sometimes have negative effects in the work. This problem will be more complicated when governments have political problems with each other, for example, India and Pakistan. Contractors who recruit multinationality will have problems in the communication between these nationalities.

13 Owner's Absence from the Company

No one can take the place of the owner in the company. Even a full time manager can not manage like the owner, even if he has full confidence. The absence of the owner usually results in a poor supervision in the company, especially if the employees get their salaries regardless of profit of the company. This problem could be reduced by giving both manager and employees specific percentage of the profit.

14 Using Computer Applications

Computers have many applications in the construction industry. Their applications are for cost estimation, planning and scheduling, accounting, and calculations.

All these applications can help the contractor to do the work easily, quickly and accurately. The accurate data produced by the computer can be an asset for making decisions. Computer shops can provide any construction company with special design package to be used for its own purpose. Also, there are packages in the market which are very important in managing projects, for example, Pramvira which is a schedule program, can maximize the utilization of labors and equipment by using the source leveling. This application is very important in construction business. "Computer is perhaps the best piece of construction equipment ever added to the industry's inventory" (Schleifer, 1990).

15 Frauds

Frauds can be seen easily in the company which does not use the business practices. When the company is not planned, organized, directed, and controlled, the chance of fraud will be higher. Frauds can happen from various departments, for example, purchasing by increasing materials prices, contracting by selling bidding information to competitors, and job site loss of materials. In order to avoid these things the contractor should use the theory which stated the responsibility is equal the accountability. The accountability must be tough to warn employees. The authority should not be given to any employees unless he passed the testing period. As high authority is given to employee, as long the testing period. The management must limit the number of people who have the company's secrets. Frauds exist in the company, a thought among the customers that this company is not doing the work perfectly, could cause the contractor to run out of the business.

16 Neglect

Neglecting is another cause of failure. When the management does not respond to problems and suggestions, this negligence may add to costs to the company. To illustrate, there was a request to buy a cover to protect materials form damage, but management neglected or did not respond on time until the materials were damaged. Also, when an equipment has a minor problem, which could later become a major problem, the management did not respond immediately to repair the minor problem until it broke down. Sometimes, employees suggest things which could help to improve their productivity, but the management neglects these things, for example, changing working hours, buying an equipment which can help to improve the work, and rearranging the layout of equipments in the job site. The neglect in solving the internal problem which is from employees or

external which is from customers, will complicate these problems and will not be easy to solve later.

2.3.2 FINANCIAL CAUSES

The financial stand of the contractor is very important for running the business. Contractors might run the business with his own money. Also, work improvement sometimes needs money because improvement needs buying new equipment or developing new techniques. All the important managerial causes could not keep the contractor save without good financial stand. The financial causes are as follows:

1 Low Margin Profit due to Competition.

Profit is the amount of money in excess of construction costs which contractor desires as a return for building a project. The profit has relation with risk and uncertainty. As the risk increases in the business, the higher potential profit is. Given the risk and uncertainty that surround construction industry, the potential margin of profit of the industry is very small compared to other industries (Adrian, 1982).

Contractors bidding on a single project will have different estimate of project cost because of the differences in structure of cost information, construction method and take-off procedures used by each contractor. However, the profit, which contractor adds to his bid, determines whether he will win the contract or not.

The number of contractors would be expected to be high because of the simplicity of establishing new construction firm. Also, as the number of contractors increase, the margin of profit decreases. Consequently, the construction industry is highly competitive and the profit margin very small. The profitability of some types of contractors in the U.S. is shown in Table 2.1 (Adrian, 1982).

Table 2.1 Profit Margins of Average Contractors in U.S.A. (Adrian, 1982).

TYPE OF CONTRACTOR	NET PROFIT MARGIN
Commercial Contractor ($ 1M Volume)	3.2
Commercial Contractor ($ 10M Volume)	2.7
Commercial Contractor ($ 100M Volume)	2.3
Heavy and Highway Contractor ($ 100M Vol.)	3.8
Residential Contractor	4.8

The net profit for the residential contractors in Eastern Province is 20-30 % as most contractors mentioned in the article about the labor problems and past mistakes are still existing, in the Al-Yawm newspaper (AlKhaldi, 1413H).

If the contractor is more specialized, the less his competition will be and the higher profit margin could be added. For example, plumbing contractor, who is doing specialized work, has less competition than the general contractor. Therefore, the plumbing contractor can add a high profit margin to his estimate than the general contractor. If the contractor adds a high profit margin, he might not win any project contract and run out of work. So contractor need to add very small profit margin which sometimes causes contractor's failure. Dun and Bradstreet Corporation found out that more than 50 % of construction failure are due to bad profit for 1986 (Kangari, 1988). When a contractor estimates a profit

to be added to a bid, he is faced with conflict constraints. If the contractor adds a high profit he may loose the work and if he adds a low profit it may cause failure. This reason is the most important factor of contractor's failure, which is low profit margin due to excessive competition.

2 *Cash Flow Management*

Most of the contractors expenses are paid in cash, for example, salaries, machines, materials, and indirect expenses. Therefore, availability of cash flow is very important for a contractor to run the business. A contractor could find few shops which would give him credit. However, there are two problems associated with purchasing in credit, prices would not be cheap as compared to cash payment and a contractor is limited to items which are available in the shop which gives him credit.

In the beginning of any contract, the contractor needs to pay for a lot of things before he gets the first payment. In public work, the progress payment will take few months after the due time because of long procedures to be followed before issuing the check. Even though the contractor will eventually get paid.

On the other hand, there is no procedure for getting the payment from the private work, it depends on the availability of cash flow from the owner. Sometimes, a contractor has to continue the work without getting payments. If the contractor stops the work for this reason, he will pay his workers while they are at home. Planning for both the work and the payments, and making strong relation are the key solution for getting the cash flow. Cash flow is the fuel for contractor, without it he will loose the business.

There are contractors who run a good profitable business, but they fail because of lack of cash flow management. A contractor should plan for cash flow, or one day he will not

have money to pay his expenses, and also there is no progress payment ready for collecting. The plan for cash flow needs cooperation between all company's divisions. This must be done formally by holding a monthly meeting which requires attendance by all related parties. For example, the finance will determine the necessity of cash flow for the next period, accounting will identify which project has the next progress payment, and the project managers will complete the project to the percentage which is required to get progress payment. Consequently, the cash flow will high priority in the management. Also, the meeting could help to solve all problems related to delay in progress payment. If the contractor is able to manage his cash flow effectively, his business will run smoothly.

3 Bill and Collecting Effectively

Cash flow is very important for a contractor. Therefore, billing and collecting effectively are the ways to get cash flow. Contract documents must state the procedures for billing and collecting money clearly from the customers. It is important to send the bill to customer on time. Adding charges to late submission of payment will encourage customers to pay on time.

Money is important for contractor and without it, problems can arise. Delaying the payment will create problem to contractor, because he cannot pay his expenses and will slow the work. When project slows down productivity will be affected. "Ineffective billing and collecting procedures can directly or indirectly put a contractor out of business" (Schleifer, 1990). Difficulty in collecting from customers was mentioned in business failure record as an important factor in the construction industry (Kungari, 1988).

4 *Poor Estimation Practices*

Cost estimation of the job for a competitive bid is not an easy task. The cost of labor, construction equipment, material, subcontracts, taxes overhead, and surety bond are calculated and combined with markup to arrive at the final bid amount. This will determine whether a contractor gets the job or not. The costs of labors and construction equipments are the most difficult to estimate and control, because the cost depends on production rate, such as labor hours to tie a ton of reinforcing steel or equipment hours required per cubic meter of excavation. These hours are multiplied by the labor wages rates or equipment use rates. "Pricing of labor and equipment costs on the basis of elementary work items is traditional with and fundamental to construction estimating and is the only dependable way of predicting production costs with reasonable accuracy" (Clough, 1972).

The source of the unit costs is the previous projects which were done before. Also, there are construction cost indexes for forecasting probable construction costs. "Two recommended source of cost indexes are Engineering News Record and F.W. Dodge Reports, both published by McGraw-Hill" (ASCE, 1988).

In addition, cost estimation guides are available for the estimator. All these methods help the estimator for preparing the costs because the accuracy is the key for successful business. When the competition increases, the estimator's duty is more critical because the high costs will cause the contractor to run out of business and the low costs will cause the contractor's failure. Therefore, it is recommended for small firms to hire or to contract estimating services. Bidding with reasonable price is the key for successful business.

5 *Evaluate Project Profit in one Fiscal Year*

In construction, it is extremely difficult, in one fiscal year to know whether or not each project is making a profit or a loss before the project is completed. This difficulty comes from a variety of things associated with construction, for example, manpower, machines, materials, money and subcontractors. Even though, the contractor could prepare a financial statement, there is no way to check or verify the accuracy of basic data which is prepared by contractor's staff. The accountant will depend on his calculations in preparing the basic data for preparing the financial statement without checking the accuracy because projects are far out in the field and materials stored and in transit are almost impossible to do inventory.

The contractor or his staff cannot determine the percentage of completion of ongoing construction projects, except for small jobs, because of the interference in construction work. Also, it is not easy to finish one type of work then move to another type, for example, to finish all plumbing work then move to paint work. This will delay the project and increase the cost. The percentage of completion is good for statement purposes. A contractor should use the work breakdown structure for evaluating project profit. Estimator breaks down the project into work items. As more work items singled out, more accuracy is obtained. Then, the estimator will determine the percentage of completion for each work item and the percentage of work item in the project. This will evaluate project profitability with reasonable certainty, but it will not determine whether or not the job is making money. Being able to develop contract profitability report for projects every month will reduce the risk of failure.

6 *Employee Benefits and Compensations*

For any business, employees should be given bonuses to improve their motivation toward the company. "Performance bonuses are quite common in the construction industry" (Schleifer, 1990). However, in Saudi Arabia, bonuses are not quite common. It is applied in large construction companies, but medium or small construction companies do not give bonuses. These bonuses should be given to the employees as part of a careful considered compensation plan. This must be understood and known by all of the participants. Bonuses have to be very effective and fair. Bonuses will cause more problems in the company if they are random and unorganized. Bonuses must be connected to employee's performance and company's profit.

Some companies give unrealistic employee benefits and bonuses during good profitable year. This will cause problems when lean years hit (Schleifer,1990).

One common mistake in many contractors is to delay the employees benefits for more than one month, six months or even more, this mistake could decrease productivity of employees. If a contractor does not pay his employees salaries, he will have more cash flow which he may spend for non important things. Employees benefits will increase month by month until they become too much to pay. This is the beginning of the disease. Contractor must pay his employees on monthly basis to avoid all problems.

7 *Controlling Equipment Cost and Usage*

Equipments are very important to contractors. They could save time and money. There are two reasons to buy them either to replace old or to save money by owning equipments. In replacing equipments contractor must determine whether the new equipment is really

more productive than the old. The calculation must include all costs, for example, maintenance, downtime, operation, obsolescence and replacement cost.

In buying a new equipment, the contractor must decide whether to own or to lease. The more suitable for his business must be considered.

Equipment costs which included maintenance, operation and replacement must be estimated well. Contractor may loose because of not recognizing, recording and planning for all equipment cost. In calculating the replacement cost, it is important to update the recent cost of the equipment. Contractor should include the cost of idle equipment in estimating job profitability. Also, the cost of the "downtime which may vary from 10 percent in fair weather areas to 40 percent in areas where winter is a factor" (Schleifer, 1990) should be considered.

Many contractors are not aware of how maintenance is important. They do maintenance only when equipment is down. This will increase the downtime. For this reason, contractors must establish daily and periodic maintenance program according to his uses and type of equipment. Contractor usually charges the equipment repair costs to the job that cause it. This may increase the cost of the job and contractor will complain that this job does not make profit which is wrong.

Contractor who has very expensive equipment must have very effective program to calculate equipment cost or he may be loosing money. The equipment repair cost must be accounted for from the first month it is put into the service.

2.3.3 EXPANSION CAUSES

The expansion is the normal growth in any business. If the company doesn't develop, the companies which-are the same size, will develop and become stronger than the solid

company. However, the expansion should be done under very good researching, planning, controlling. The size of expansion should be reasonable for the business to avoid failure. The expansion should be done with the company long term planning. A lack of the work is most reason for expansion, but it needs very careful planning. The expansion causes are defined as under:

1 Expanding into New Geographic Locations

The change from geographic area in which a contractor is usually bidding, achieving productive work and making a profit, can cause failure. The distance varies from one contractor to another. It could be five or ten miles. Sometimes it is one city or province or country. Constructing a project outside the geographic area could be done, but there is a question about the profit.

There are many reasons for a contractor to expand into new geographic areas, for example, lack of work in local area, normal growth, and opportunity to follow customers or designers. It could be done but the contractor must recognize and plan for the risks.

A contractor must be aware of all risks involved in changing a geographic area. The difference in customs, methods, procedures, regulations and labor conditions can be quite significant and expensive if not planned for. Regulatory requirements and inspection may differ from one country to another. Moving equipment and men from job to job efficiently is not an easy task. Problems associated with the movements are not easy to predict, such as accidents, losses, and breakdowns. Sometimes, the efficient movement of men, equipment and materials is the reason for making a profit in contractor's working area.

If a contractor wants to expand his normal working area safely, he could begin close to the edge of his existing work area. This will test his ability to run this work and to make a

profit. Assigning the job to a top man who could be trusted by a contractor. He should start with one job in the mid or lowest range of his project size. The best and the safest way for a contractor is to stay in his geographic area and to give the projects more attention. The contractor will usually make higher profits. Opening a regional office would have less risk than to expand in a new geographic area. (Schleifer, 1990)

2 *Opening a Regional Office*

Opening a regional office is a new business which can do exactly the same function of the office, although it is a part of the company. The talent required at the regional office is the same when the construction business started with. The distance is not a great factor in locating a regional office as it is in expanding in a new geographic area because the regional office will depend on the market-place rather than the target opportunity. So the best way for a contractor, who want to expand into a new geographic area, is to open a regional office. However, the construction must plan for his regional office carefully (Schleifer, 1990).

The reason for opening regional office are the same reasons for expanding into a new geographic area.

The market situation in locating a regional office is very important because the better the market in a new location, the lesser the risks will be. A contractor should satisfy the local knowledge factor even if he has done a good research. The knowledge of the area will be gained by bidding and doing some works.

Assigning a very good person to run the work is the absolute key to regional office success. It is recommended that the contractor leaves the home office and run the new regional office. This is because the home office is working smoothly and making a profit.

A contractor should start with one job in the medium or lower range of his normal job but not so much that the lesson gets expensive.

When a contractor decides to open a regional office, he must have a plan for the office and as part of the plan is a withdrawal plan. It should determine in advance of how long the contractor will continue the effort if it does not succeed, because making a profit in the first or second year is very difficult. If the losses exceed the planned amount, the plan should be reviewed. The contractor will decide to carry additional losses and continue or to withdraw immediately (Schleifer, 1990).

3 *Increased Number of Projects*

A contractor must know his ability and the maximum volume for each year. The real planning for the work will determine a contractor's ability and his maximum volume yearly, so each contractor must have maximum number of projects. There are many factors which could be considered in determining the maximum number of projects, for example, number of workers, management ability, the size of contractor's geographic area, labor productivity and the type of work.

There is no formula to be used in determining number of projects with certain number of workers because a contractor with 50 workers can produce more than another contractor with same number of workers. This is because the productivity varies from a contractor to another. By experience, a contractor will be able to determine the number of projects. The management ability in maximizing the usage of workers by the proper planning would increase the number of projects. Supervision and the quality of the work will be affected if a contractor increased the number of projects. Increasing number of projects while the management remains the same, will cause poor supervision, and consequently, the poor quality of work, which increases complains, and the need to rebuild the work. The

contractor may use subcontractor which sometimes does not do the works as well as the contractor does. Projects may delay and the contractor will pay penalty. If a contractor increases the number of projects, he will need to increase the staff for recruitment and delivery. This will add extra cost to each project. So, the contractor can concentrate in few projects which are enough for his size. This has advantages, for example, reducing time of completion, reducing the delivery cost for material, and having better supervision for each project.

4 Increased Size of Projects

The most common factor of failure is the dramatic increase in the size of project, if the contractor is not aware of the safe ways to grow and expand. There is no formula and very few rules for determining the limits of expansion. "Undertaking larger projects is a natural part of the growth of a construction company; the order of magnitude addressed here, however, is two or three times to previous largest project" (Schleifer, 1990). For example, if a contractor's largest project is SR 1 million road projects or buildings, he can construct SR 2.5 million road projects or buildings. However, the contractor will not be able to make a profit from a job four times greater than largest ever built, unless there are additional resources and a huge amount of careful planning.

There are silly and opportunistic reasons for taking on much bigger jobs, for example, a good client wanted the contractor to do the work, the job was close to the office, and the contractor had relation with the owner. A contractor would increase his risks if he increases the project size without very carefully estimating and planning.

As the project size increases, the risk increases. The contractor might complete a job greater than the largest ever built but he does not make a profit. While a contractor can make a profit by doing work similar to the work he has done before.

The contractor will have problems with the progress payment. To illustrate, a contractor had two or three projects at a any given time and all of them were equal or less than the largest project volume. One of these projects might be completed and he needed to collect money. Another project might be in the middle stages and it generated a large monthly payment. The third project which was started recently, was about to produce some good cash flow through front loading. In this case, the contractor had a reasonable cash flow and the time and resources available to run his small job and keep them profitable. On the other hand, if a contractor had only one project which was four times greater than the largest ever built, he would have a slow payment because he had one payment after a certain percentage of progress. This will put the contractor in the risks and increase the probability of failure. (Schleifer, 1990)

5 *Change in the Type of Work*

A contractor sometimes shift from one type of construction to another or add a new type to the current work. Contractors rarely stop current field and start new field. However, expanding into new types of construction is quite common. Construction companies may add, for example, hospitals to high-rise office building. The contractor should recognize the importance of researching and planning before taking a new type of construction. The entrance cost which is the money paid for learning period during which a contractor needs to learn a new type of work, is always under estimated. A contractor may complete one or two losing projects before he can build a new type of construction profitably. It is stated that "successful contractors typically become successful by doing a certain type of construction of a certain size in a certain area." (Schleifer, 1990)

The most common reason for changing the type of work is to accelerate the growth of the company. Also, there are chances, for example, a good customer or friend having a job to offer that it is not the same type of work but close enough.

Each contractor should specialize in his work. There are many contractors who see all building projects the same until they suffer from a project. Many contractors develop and become successful by perfecting their skills and abilities needed for their speciality. For these reasons, they can do the work better and bid it better than their competitors.

The risks of working in a new type are the same as in starting a new business. A company needs to hire one senior person who knows the new type of work. This person may need time to be familiar with the company. There is chance that this person is not qualified for the new type of work. There are many contractors who are not only able to make profit but are also able to finish without subcontracting these kind of jobs.

A contractor must determine what type of work he can do best and even in which part of work he can do better, then, he can move forward in the type of work with more confidence and less risks. If he wants to expand into other types of work, he should evaluate all the risks first, take a small project, and proceed with another. Expanding into a new type of work can cause contractor's failure if he does not know his speciality.

6 *Lack of Managerial Maturity*

Managerial maturity means that contractor's managerial abilities must mature or develop as his business does. So the contractor should accept the change in the management as the company grows during successful times to assume continuous success. There are many companies which start, continue, and become large and so many more fail. The only real difference between the continued successful construction business and the early and mid

time failures is the management (Schleifer, 1990). Management skill should have a certain amount of vision, so that the planning for the future can take place. In the beginning, a construction company does not have trained or inherently gifted managers, it needs to develop the mature managerial skills to grow with the company. The gradual growth of a construction business will be more stable than the rapidly growing one. This is because rapid growth will not give the company chance to develop the mature managerial skills. "If a business is expanding even at a modest rate of 10 to 15 percent a year, it will periodically grow out of its systems and procedures, its management needs will change. If the growth rate is anything above 15%, the need for management development is compounded". (Schleifer, 1990)

A construction contractor who is running a fast growing company often finds difficulty in determining the limit of his effectiveness. A contractor cannot predict the point at which volume will outstrip management ability because the threshold is different from contractor to another. However, there are telltale signs which indicate that the management is doing more than the limit of its effectiveness, for example, complains from long time trusted employees, an increase in job site accidents, and a drop off in the performance or response of trusted subcontractors. One or two of them could happen with the normal growth of the business, but when several of them occur at once, without any reason, this is an indication of something wrong. In this case, a contractor either has problem with management skills or has problem with the delegation of authority. The true delegation of authority within construction is very important because the contractor can not be in every place at the same time to make every major or minor decisions in the company. Many managers are not encouraged to put effort in making decision when they are not authorized to make the decision. The lack of managerial maturity in expanding organization can contribute to contractor's failure.

7 *Changes from Private to Public or Vice Versa*

The most fatal change is from public to private or from private to public sectors without recognizing the differences and risks expected. Public projects are related to government and all agencies which are owned and supervised by government, for example, SABIC, SAMAREC and Royal Commission of Jubail and Yanbu. The construction in government and their agencies are conducted according to specifications. Private projects are not related to government or their agencies and don't have any rigorous specifications.

The differences between private and public projects should be recognized by a contractor to avoid the failure. The first difference is the quality for bid lists. In public work, bidders need to pre-qualify with the public body, but the list is open for any contractor. When contractors have pre-qualified, they have a good source of work to bid on. Projects must be advertised. In private work, there is no pre-qualification for bid lists. Owners or the architects pick selected bidders, in an informal way. The second difference is the criteria used for selecting winning bids. While public projects are required to award to lower bidders, private selection is concerned for the quality and for the price. The third difference is the amount of collaboration between parties. In public work, the parties are strangers and the relation between them will start with the work. This is because of awarding to lowest bid which could be any contractor. However, the awarding party in private work picks the bidders who are known or at least preselected contractor. For this reason, the amount of collaboration between parties would be more in private projects than in public. (Schleifer, 1990).

The fourth difference is the quality of the work expected and delivered. "A public project is usually administered by the book" (Schleifer, 1990). So the project would be expected to meet minimally accepted standards. Because the contractor for private projects

preserve his relationship with the owner, the quality of the work would be superior compared to public work. The fifth difference is the amount of changes. In public work, awarding will go to the lower price which does not allow leeway to do minor change without charges. The contractor for public project will make profit in change orders. In private work, the reasonable price will allow the minor change to be done without informal change orders.

Changing from private to public or vice versa will expose contractors to very high risks if the are not aware of all differences. In public work, a contractor should hunt every opportunity for change orders, or he might not make a profit. In private work, a contractor should add a reasonable fee and profit into his bid to allow for minor changes and preserve a good relationship with the owner. Changing between private and public sector could be done, but it needs very careful preparing, planning, and estimating.

2.3.4 ENVIRONMENTAL CAUSES

The environmental causes affecting the local area will be included in this part. The environmental causes are national slump in the economy, construction industry regulation in Saudi Arabia, owner involvement in construction phase, and bad weather. The environmental causes are defined as follows:

1 National Slump in the Economy

Money runs in circle and the government is part of the circle. If the government does not have money, they will not offer new projects and contractors will run out of work. Usually, government projects are large and require following specifications, so it costs a lot of money. This factor is very important because if the economy of the country is good, there will be more development which increases the chances for contractors to get work.

This is the case in Saudi Arabia since the government owns and supervises almost all of the large projects built in this country.

2 *Construction Industry Regulation in Saudi Arabia*

The entrance to construction industry is very simple in Saudi Arabia. The contractor needs to apply to the Ministry of Commerce with required documents. These documents are as follows: A bank certification which shows that the contractor has SR 150,000 or more, it depends on its speciality, and documents to prove that a contractor has office, storage and car. It is seen that the regulation does not have anything about the owner. The only regulation is that he is not government employee. There is no limited education or good past experience. Consequently, many unqualified contractors would enter the business and increase the failure. If the contractor is not an engineer or doesn't have enough experience in construction, the government must force the contractor to have one civil engineer to handle the engineering work.

Contracts in private sector are not controlled which lead to problems to both the owner and contractor. These problems could cause failures. Awarding projects to the lowest bidder without making pre-qualification is a contributing factor to failure. There are many studies which have been done to identify the problems associated in applying this system. The construction industry must have more attention from government and very strong regulations to reduce the business failures.

3 *Owner Involvement in Construction Phase*

In any construction project, the three main goals are; low cost, high quality, and rapid completion. "The owner's objective is to obtain high quality facility through good use of planning, good designing and good construction" (Almsaid, 1989). It is the owner's

responsibilities to determine these goals and to set their priorities for project completion. The achievable level of these goals begins with the owner because his role is the most critical. The owner's key roles are to form the project team as early as possible, assign responsibilities and establish levels of performance, include specifications for quality performance as part of bid evaluation, establish the contracting and purchasing program and plan for necessary site preparation from each project team member (ASCE, 1988).

If the owner's key roles were prepared accurately and quickly, this will help the contractor to do work smoothly. However, if the preparation was not done properly, this will increase reworks, change orders and claims in the project. The owner will pay all costs which are caused by bad preparation of his key roles but there are costs associated with this problems and not easy to be estimated, for example, disruption of crew and flow operation, disruption of schedule, decreasing productivity, learn curve interruption. Therefore, the contractor must study the design very carefully and know how the owner involved in the planning and design. If the owner was not involved, the contractor needs to add additional cost for unexpected interruption in the work to avoid extra costs which could cause failure.

4 Bad Weather

The Eastern Province of Saudi Arabia has weather conditions with temperature as high as 50°C, thus the contractors must contend with extreme high temperature. "Much of the Eastern Province of Saudi Arabia has hot dry desert climate where the air temperature rises quickly after sunrise to a high maximum mean of 43 to 49°C in the summer. During the cool season, the maximum mean ranges from 27 to 32°C. Night time minimal mean temperature in the summer range from 24 to 32°C, and in the winter from 10 to 18°C. The diurnal range is high, from 17 to 22°C. Relative humidities range from 10 to 55%. Precipitation is slight, from 50 to 155 mm per year. During flash storms up to 50 mm of

rainfall can occur in a few hours. Skies are normally clear, leading to intense solar radiation during the day and high night time re-radiation. Winds are usually local, often hot, and during periods of high velocities carry sand and dust. Along the Gulf, the weather is modified by the presence of a large body of water where the relative humidities range from 50 to 90% throughout the year. The high moisture content in the air reduces intense direct day-time solar radiation as well as night time re-radiation. This is regarded to be amongst the most unfavorable climates of the earth." (Beckman, 1984).

The temperature and humidity has a strong relation with the productivity as shown in Figure 2.7. The effects of temperature and relative humidity on the productivity of electricians and brick layers and for equipment operating and manual task are also shown in Figure 2.7. The maximum productivity can be gained when the temperature is from 50 to 70°F and the humidity is from 30 to 80%. In the high temperature and humidity, workers will feel dulness of senses, poor coordination, poor mental attitude, and frequent work stoppage.

Consequently, the contractor must expect reduction in the productivity, which should be considered in bid estimation, during the summer session. In order to improve productivity, the contractor should adjust working hours, plan most of the work in shade or indoor if it is possible, hurry work on enclosures of the building, provide shade, and schedule people to breaks. Being able to maximize the productivity will reduce the cost and reduce the chances of failure.

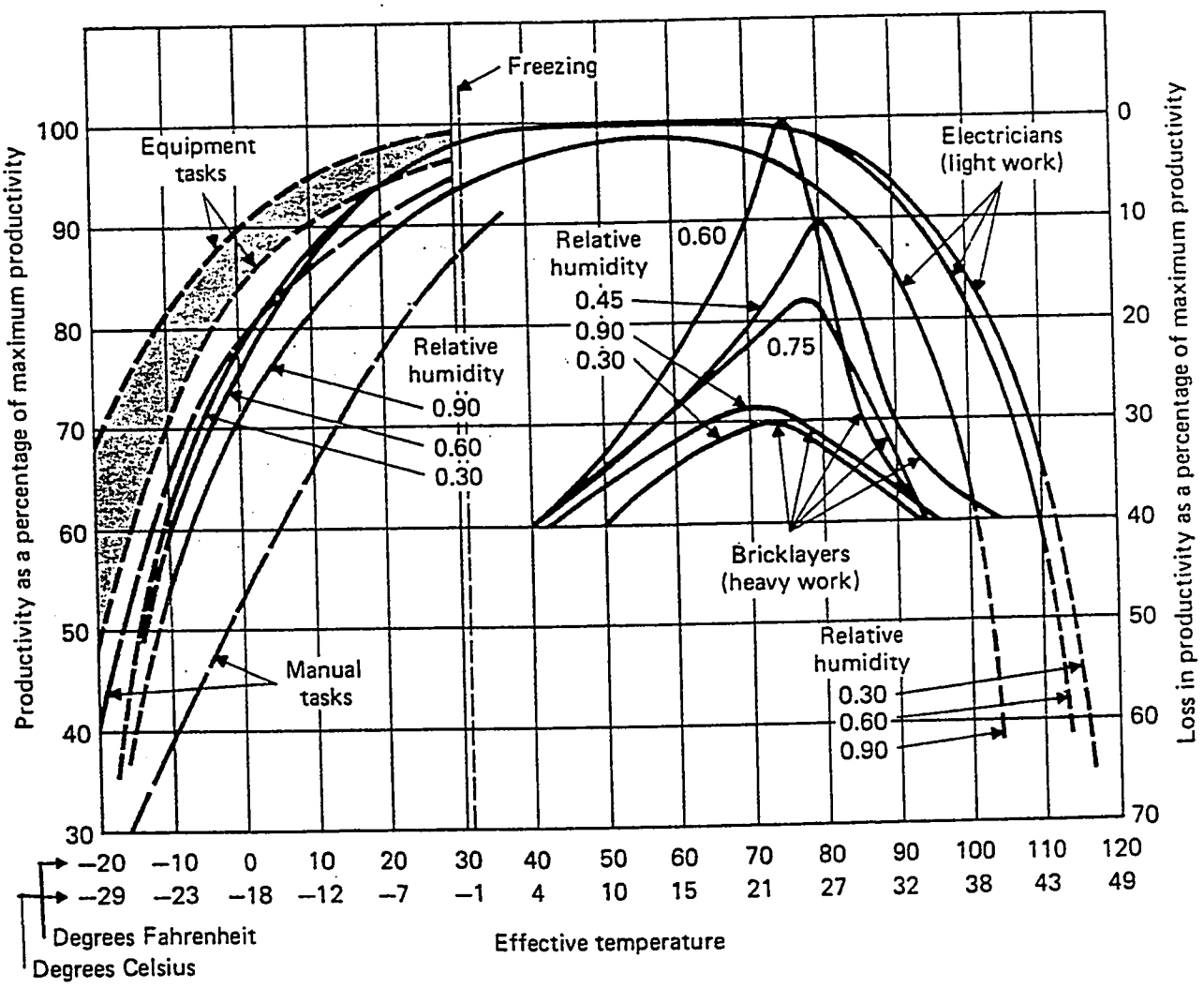


Figure 2.7 Effects of Temperature and Relative Humidity on Productivity (Oglesby et al, 1989)

2.4 SUMMARY

This chapter discussed the causes of failures among contractors. There are thirty four causes which were combined into four areas, namely managerial, finance, expansion, and environmental. The following chapter is devoted to a detailed survey of three parties (group one, group two, and group three). It also includes research methodology and sampling techniques used to measure the severity index of the major causes of failures.

CHAPTER 3

DESCRIPTION OF THE SURVEY

This chapter includes the research methodology and sampling techniques used to measure the severity indices of the major causes of failures.

3.1 QUESTIONNAIRE DESIGN

This investigation was undertaken in two stages. The first stage was the collection of data. This stage included reviewing related literatures, and gathering data through site visits, interviews, and discussions with different grade of contractors. The second stage focused on data analysis and identification of the most relevant factors influencing causes of contractor failures. This led to the formation of the questionnaire (see appendix I) which was distributed to contractors.

The questionnaire carries both the instructions and questions to respondents and provides a block for the respondent to write any comments. The researcher considered both the subject content and the wording of each question in terms of shared vocabulary and clarity. Each question is stated in such a way as to be as precise, short, simple and understandable.

There are three main parts in the questionnaire (see Appendix I). The first part is an introduction to explain the idea and the purpose of the survey. The second part, which is from question 1 to 6, conforms to general information questions including the contractor's specialty in construction, the nationality of the company, experience, annual volume, and

number of workers and the highest grade of the company. The respondent is requested to choose the most appropriate answer.

The third part, which is question 7, concerns the causes of contractor failure in building and highways construction projects. The causes of contractors' failures are divided into four groups, namely managerial causes, financial causes, expansion causes, and environmental causes. The purpose of the dividing is to give respondents a full picture for each type of cause. This would give respondents opportunity to add more causes.

For each question, the respondents have five options. The first four are, 'very influence', 'influence', 'slightly influence', and 'not influence'. The last option is 'can't decide' which was added to permit respondents not to answer if the question was not related to his work. For this reason, our analysis will not be affected by questions unrelated to a contractor's specialization. Any blank question in the questionnaire will be treated as the respondent inability to decide. The first four options express the severity of the causes to the respondent. The first two show the option is severe while third and fourth show it is not so severe. Thus, the questions in a standardized format and sequence. This guarantees that each question is asked the same way in each questionnaire. At the same time, the questionnaire was simple to administer and relatively easy to analyze and compile. Consequently, the frame of the reference is specified for response and this increases the chance for securing answers which are relevant to the inquiry.

3.2 STATISTICAL SAMPLING

A. Sample Size

In this study, the contractors who had qualified and registered in the Ministry of Housing and Public Works this year 1413H will have had the chance to participate. The Ministry of Public Works classified contractors to fields and activities as shown in Table

3.1. For example, the building field has certain activities, namely public buildings, housing, commercial buildings, etc. In this study, two fields have been included, buildings and roads.

Table 3.1 Fields & Activities Of Classifications

(Ministry of Housing and Public Works Classification, 1413 A.H.)

DAMS
- Earth Dams
- Concrete Dams

WELL DRILLING
- Surface Wells

MAINTENANCE & OPERATIONS
- Building Maintenance
- Road Maintenance
- Maintenance & Operation of W/S System
- Operation of W/S System
- Maintenance of W/S System
- Maintenance & Operation of Water System
- Maintenance & Operation of Electrical, Mechanical Instl.
- etc.
- Operation of Electrical, Mechanical Instl.
- Maintenance of Electrical, Mechanical Instl.
- Maintenance of Electrical Instl.
- Operation of Electrical Instl.
- Maintenance & Operation of Electrical Instl.
- Maintenance of Mechanical Instl.
- Operation of Mechanical Instl.

GENERAL MAINTENANCE

BUILDINGS
- Public Buildings
- Housing
- Commercial Buildings
- Educational Facilities
- Recreational Facilities
- Medical Facilities
- Airport Buildings
- Prefabricated Buildings

ROADS
- Highways
- Streets
- Bridges
- Tunnels
- Railroads
- Airports
- Earth Moving

WATER & SEWAGE SYSTEMS
- Water Networks
- Sewage Networks
- Storm Water Drainage
- Water Treatment Plants
- Sewage Treatment Plants
- Agricultural Development

ELECTRICAL WORKS
- Power Generation
- Power Trans. & Dist.
- Lighting
- Communication Net.
- Electronic Instl.

MECHANICAL WORKS
- A/C & Refrigeration
- W & S Treatment Plants
- Pump St'ns & Treat't Plant

INDUSTRIAL WORKS
- Industrial Plants
- Refin.& Petr-Chm. Pl
- Oil & Gas Pipelines
- Water Desalination

MARINE WORKS
- Harbors
- Shipyards
- Dredging
- Underwater Lines & Tunnels
- Sea Bridges

Also, the Ministry of Public Works classified each field to five grades. The largest project volume was done by the contractor has determined the grade as shown in Table 3.2. For the foreign contractor, there are six grades as shown in Table 3.3. The contractors from grade four and above have been included in this research. This includes Saudi and foreign contractors, and also for building and road contractors. There are many contractors who are classified in two fields. The highest grade from any field will be his grade.

In this study, the population of the contracting firm has been divided into three strata:

1. Grade one and two (Group 1)

2. Grade three (Group 2)

3. Grade four (Group 3)

Grade one and two are added together because the amount of volume of grade one is just greater than grade two . For example, in the building field the amount of grade two volume is 200 million, while the amount of grade one volume is greater than 200 million. So, in this study group one will be treated as one group. The sample sizes are presented in Table 3.4.

The percentage of respondents in relation to the total number of questionnaires distributed is very low for many reasons. There are contractors on the list who had left the business. When the researcher tried to remind the contractors, he found that some contractors had left the business. On the list, there must be temporary suspension for those who are not shown for more than two years. Contractors who are on temporary suspension will not appear on the list until they come to update their information.

Table 3.2 Financial Limits for Classification Grades- Saudi Contractors.

(Ministry of Housing and Public Works Classification , 1413 A.H.)

The Table below indicates the ceiling for any project to be undertaken by a classified contractor for each grade and field in million.

GRADE ACTIVITIES	FIRST	SECOND	THIRD	FOURTH	FIFTH
Buildings	Over 200	200	50	15	5
Roads	Over 300	300	100	30	10
Water & Sewage	Over 300	100	100	30	10
Electrical Works	Over 200	200	50	15	5
Mechanical Works	Over 200	200	50	15	5
Industrial Works	Over 300	300	100	30	10
Marine Works	Over 300	300	100	30	10
Dams	Over 100	100	50	15	5
Maintenance & Oper.	Over 100	100	30	10	3
Well Drilling	Deep / Surface				

Table 3.3 Financial Limits for Classification Grades- Foreign Contractors

(Ministry of Housing and Public Works Classification , 1413 A.H.)

The Table below indicates the ceiling for any project to be undertaken by a classified contractor for each grade and field in million.

GRADE ACTIVITIES	FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH
Buildings	120	800	500	200	50	20
Roads	1200	800	500	200	50	20
Water & Sewage	1200	800	500	200	50	20
Electrical Works	1200	800	500	200	50	20
Mechanical Works	1200	800	500	200	50	20
Maint. & Operation	1200	800	500	200	50	20
Marine Works	1200	800	500	200	50	20
Dams	1200	800	500	200	50	20
Industrial Works	1200	800	500	200	50	20
General Contracting	1200	800	500	200	50	20
Well Drilling	Deep / Surface					

Table 3.4 Sample Size Information.

h	Strata	Strata Population N(h)	Sample Size	Percent of Sample to Population Size	Prop. Sample
1	Group One	85	19	22%	27.9%
2	Group Two	160	27	17%	39.7%
3	Group Three	207	22	11%	32.4%
		452	68	15%	100%

There are also some contractors who changed their business or had projects and were classified for these projects, but the projects were given completely to subcontractors. Moreover, the researcher found that there were contractors registered in Riyadh but their construction department was in AlKharj or Jubail. So, when the questionnaire reached Riyadh, it was not given any attention. For all above reasons, this size of sample will be enough for this study.

B. Scoring

For questions from one to six, no scoring was used since these consist of general information related to the respondent companies. For the seventh question, the importance of the causes of contractors failures are considered. Thus, these causes are organized according to their priority.

The options given for each question are on a four-point scale. Each factor has a severity index and the severity index is controlled by equation :

Severity Index (I_S) = $\sum_{i=1}^{4} a_i X_i$

where:

i= 1,2,3,4

The equation contains the constant a_i. This constant attempts to determine quantitative measures as an indicator of comparable responses. This simply means that the respondent keeps in mind a four-point scale while answering.

The scale value assigned to each response is as follows:

A. a_1= 0/3 for 'Not influence'

B. a_2= 1/3 for 'Slightly influence'

C. a_3= 2/3 for 'Influence'

D. a_4= 3/3 for 'Very influence'

x_i= the variable expressing the frequency of the i-th response, for i= 1,2,3,4, and illustrated as follows:

x_1= the frequency of 'very influence' response,

x_2= the frequency of 'influence' response,

x_3= the frequency of 'slightly influence' response,

x_4= the frequency of 'not influence' response.

For illustration, consider the following example:

Consider the cause of labor productivity and improvement.

The frequencies of this factor are:

- Very influence response = 32 = 47.8%
- Influence response = 27 = 40.3%
- Slightly influence response = 7 = 10.4%
- Not influence response = 1 = 1.5%
- Can't influence response = 1 = 0%

In this case our total responses are 67 since one response was dropped for 'Can't decide'.

The severity index is:

$$I_s = (3*46.9+2*40.6+10.9*1+1.6*0)/3 = 78.1$$

Accordingly, if all parties answer the first case to be 'very influence', then the severity index = 100, which means that this factor is the most important factor and the first in the rank. On the other hand, if all answers are 'not influence', then the severity index is = 0, which means that this factor is not relevant and the last in the rank. Consequently, this will give a scale from 0% to 100%.

The causes of failure are organized in descending order according to their severity indices. Thus, each grade has a list of these factors ranked according to their severity indices. As a result, three lists have obtained a group one list, group two list, and group three list. A fourth list will represent the opinion of all four grades together and is called a standard list. Finally, the agreement between any two grades can be measured quantitatively using the rank correlation theory.

3.3 SUMMARY

This chapter demonstrated the way the data have been collected and the approach that was developed which resulted in the final questionnaire. The responses were collected through the post office. Samples of 19 group one contractors, 27 group two contractors, 22 group three contractors were surveyed. The sampling and scoring techniques are presented. The next chapter is devoted to an analysis and discussion of the survey results.

CHAPTER 4

FINDINGS AND RESULTS

This chapter presents the survey data and discusses the results obtained from these data.

4.1 STATISTICAL METHODS

The following statistical methods were used in this report:

1. Tabulation, and Cross Tabulation
2. Statistical techniques
3. Correlation
4. Ranking

Figure 4.1 shows these statistical methods

The data resulting from this study were analyzed and are presented in 12 tables and 12 diagrams using these methods. An explanation of each of these methods follows:

4.1.1 Tabulation, and Cross Tabulation

Cross tabulation involves placing the survey data into tabular form (a two-way table) so that the functional relation of these data can be described. Questions 1, 3, 4, and 5 are crossed with question 6. As was mentioned earlier (section 3.1 a), grade one and two, grade three, and grade four, will be group one, group two and group three respectively. The results are shown in Tables 4.1, 4.2, 4.3, and 4.4. The frequencies of the total for each table are shown in Figures 4.2, 4.3, 4.4, and 4.5. Additionally, the sixth question was crossed with causes of failures to find the opinion of each party. The frequencies of the causes of failures are presented in appendix II.

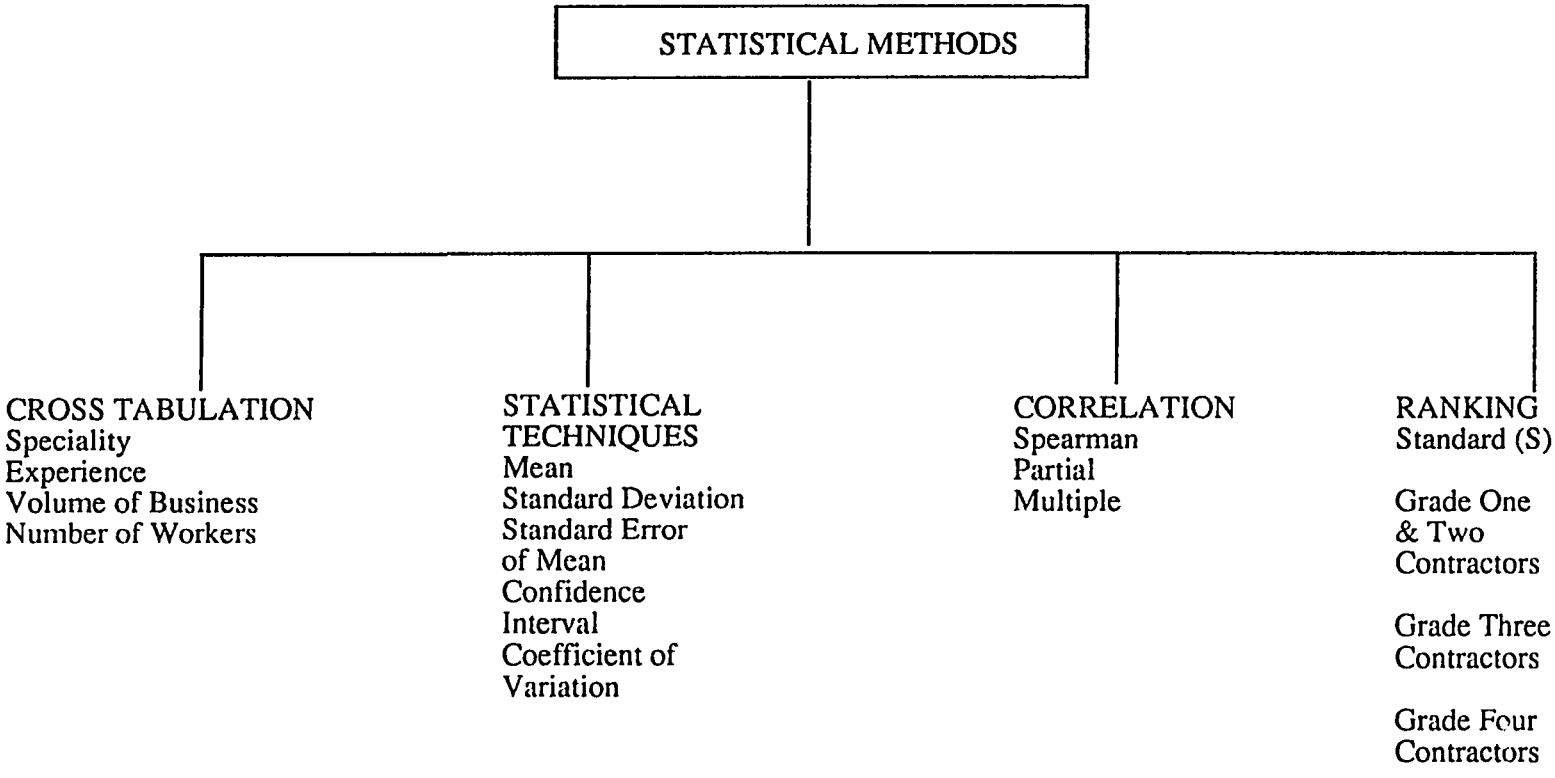


Figure 4.1 Statistical Methods

Table 4.1 Cross Tabulation of All Activities for Each Contractor of Each of the Tested Groups.

FREQUENCY PERCENT ROW PCT COL PCT	Residential Houses	General Buildings	Highways	Heavy Construction	Other Construction	Total
GROUP ONE	6 5.22 15.79 40.0	15 13.04 39.47 31.91	8 6.96 21.05 27.59	6 5.22 15.79 46.15	3 2.61 7.90 27.28	38 33.04
GROUP TWO	6 5.22 13.95 40.0	19 16.52 44.19 40.43	10 16.52 23.26 34.48	4 3.48 9.30 30.77	4 3.48 9.30 36.36	43 37.39
GROUP THREE	3 2.61 8.82 20.00	13 11.30 38.24 27.66	11 9.57 32.35 37.93	3 2.61 8.82 23.08	4 3.48 11.77 36.36	34 29.57
TOTAL	15 13.04	47 40.87	29 25.22	13 11.30	11 9.57	115* 100

* This number does not equal the number of samples because there are contractors who have more than one activity.

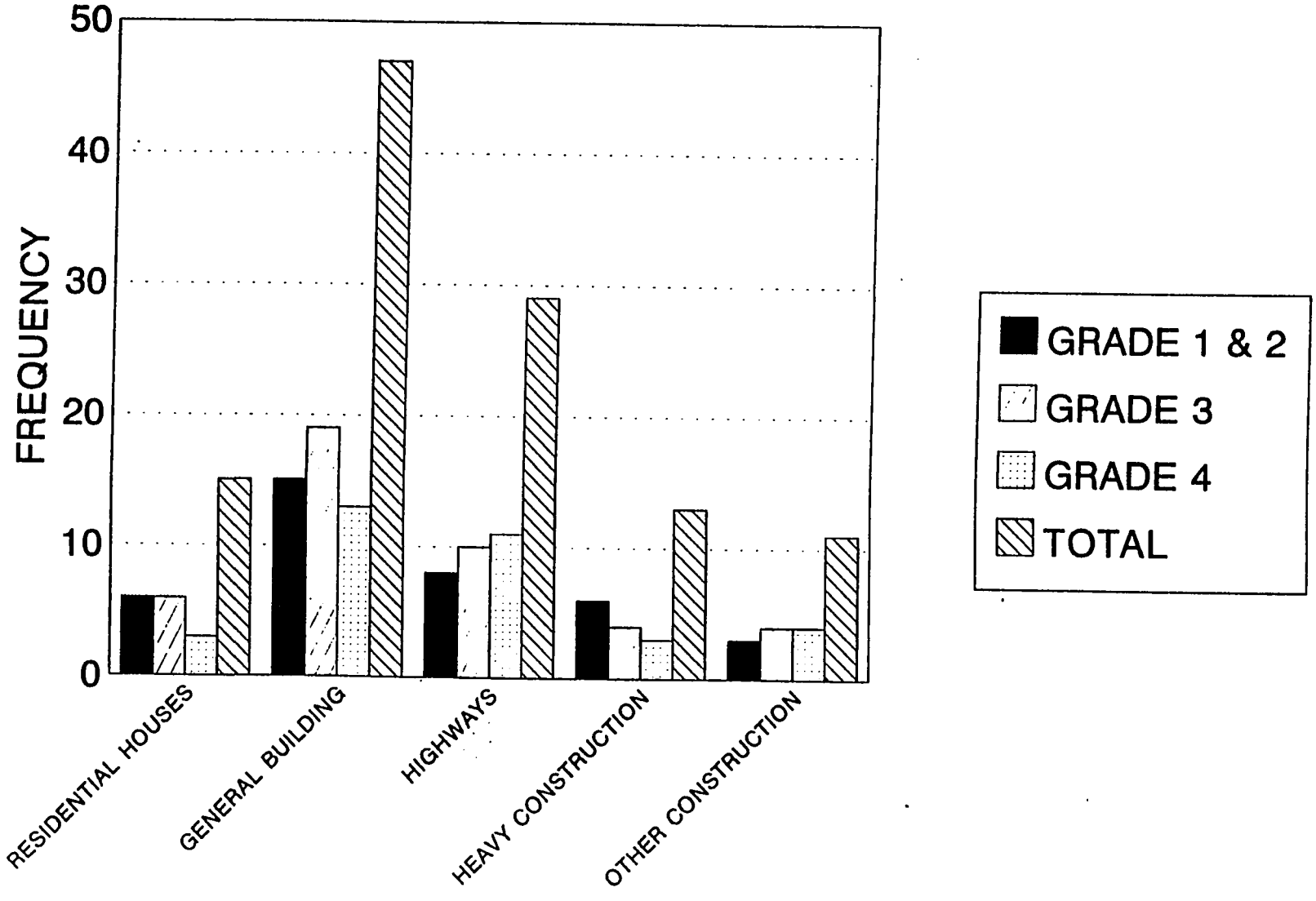


FIGURE 4.2 CROSS TABULATION FOR ALL ACTIVITIES OF EACH OF TESTED GROUPS

Table 4.2 Cross Tabulation of the Experience of Each of the Tested Groups.

FREQUENCY PERCENT ROW PCT COL PCT	>3 years <5 years	>5 years <10 years	<10 years	TOTAL
GROUP ONE	0 0 0 0	0 0 0 0	19 27.94 100 30.51	19 27.94
GROUP TWO	0 0 0 0	2 2.94 7.41 40.0	25 36.76 92.59 40.68	27 39.71
GROUP THREE	1 1.47 4.54 100	3 4.41 13.64 60.0	18 26.47 81.82 28.81	22 32.35
TOTAL	1 1.47	5 7.35	62 91.18	68 100.0

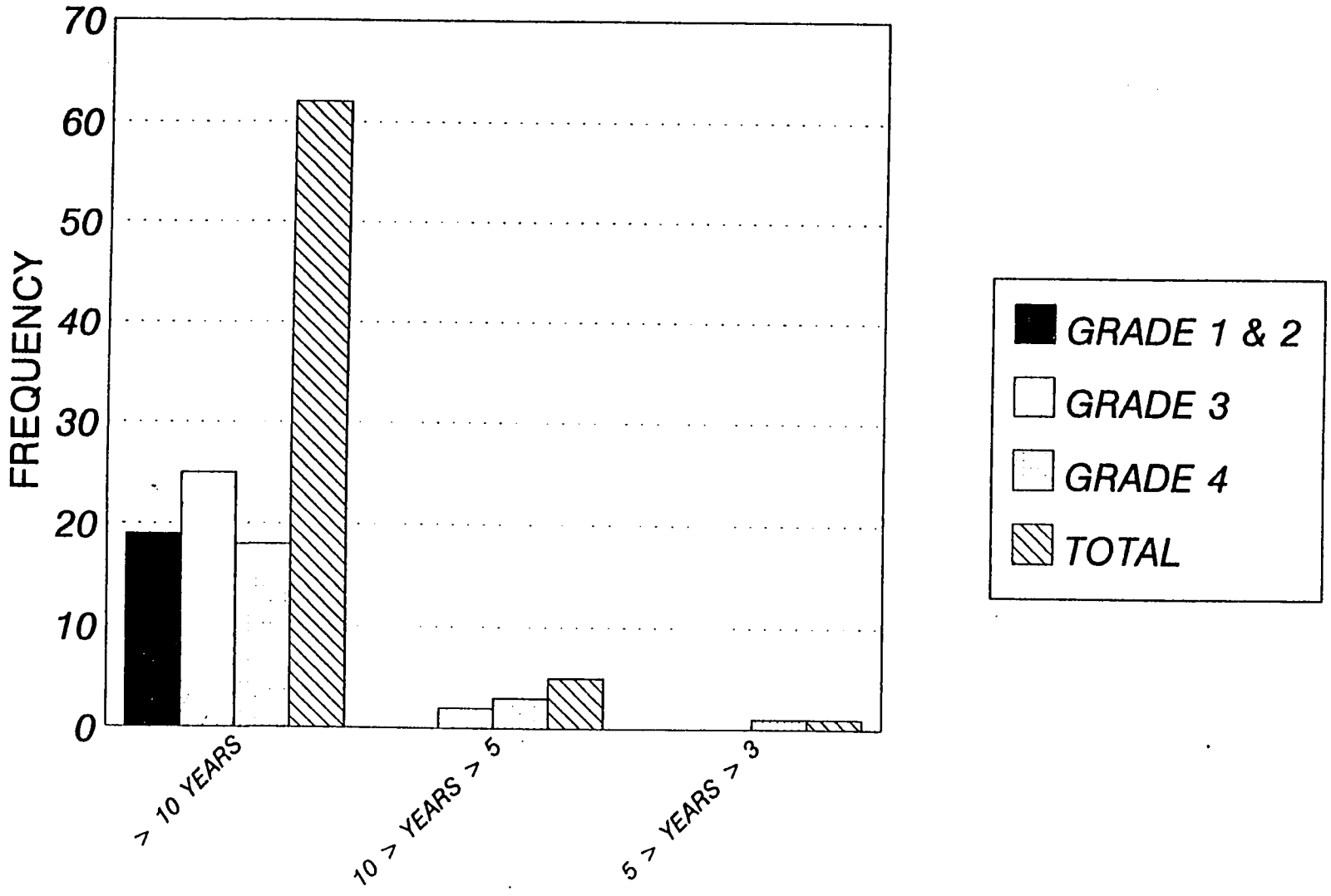


FIGURE 4.3 CROSS TABULATION OF THE EXPERIENCE OF EACH OF TESTED GROUPS

Table 4.3 Cross Tabulation of the Annual Construction Volume in SR million of Each of the Tested Groups.

FREQUENCY PERCENT ROW PCT COL PCT	>500	250- 500	100- 250	50 - 100	10-50	<10	TOTAL
GROUP ONE	2 2.94 10.53 100	1 1.47 5.26 50.0	6 8.82 31.58 66.67	7 10.29 36.84 35	3 4.41 15.79 10.34	0 0 0 0	19 27.94
GROUP TWO	0 0 0 0	1 1.47 3.70 50	2 2.94 7.41 22.22	10 14.71 37.04 50	13 19.12 48.15 44.83	1 1.47 3.70 16.67	27 39.71
GROUP THREE	0 0 0 0	0 0 0 0	1 1.47 4.54 11.11	3 4.41 13.64 15	13 19.12 59.09 44.83	5 7.35 22.73 83.33	22 32.35
TOTAL	2 2.94	2 2.94	9 13.23	20 29.41	29 42.65	6 8.82	68 100

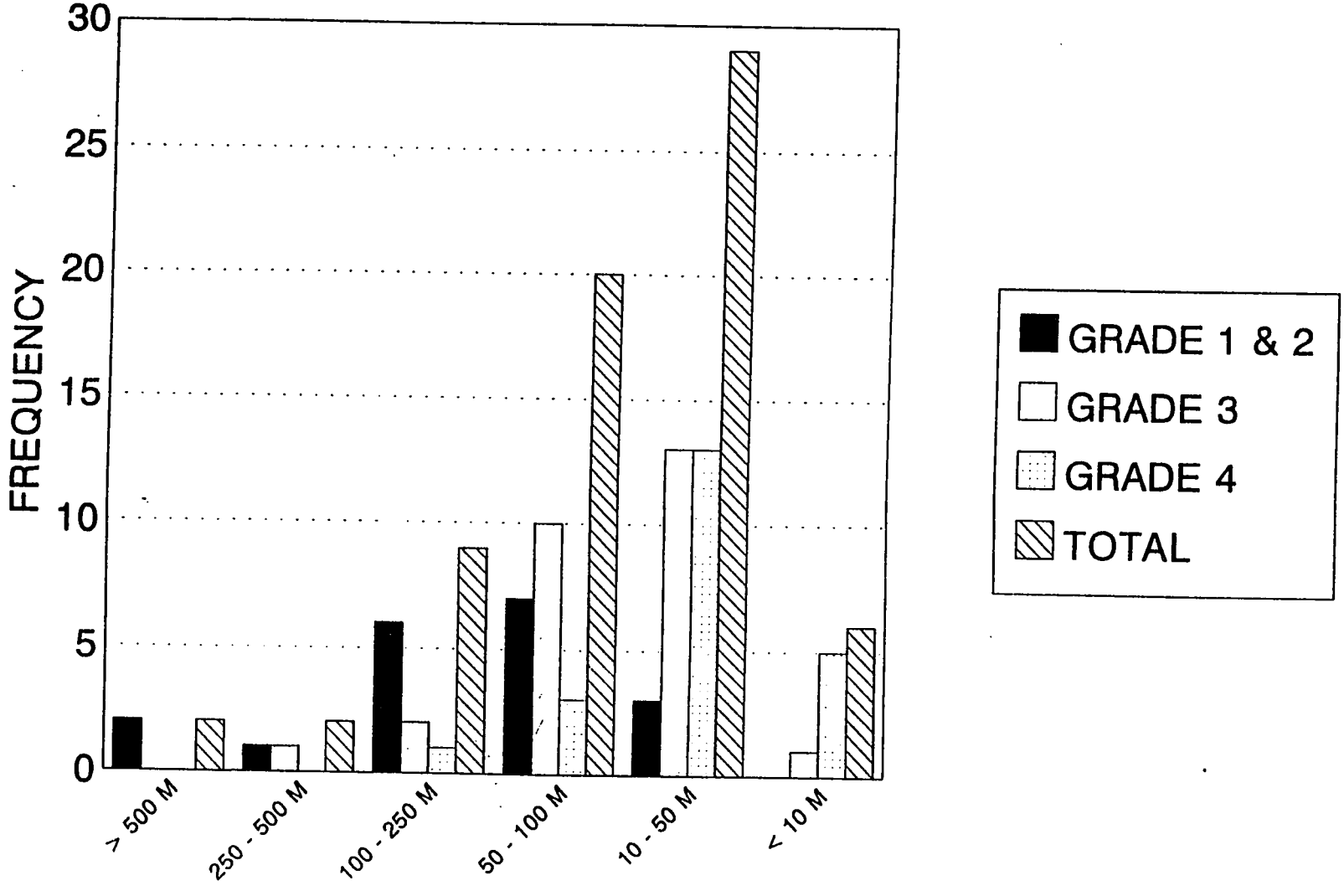


FIGURE 4.4 CROSS TABULATION OF ANNUL CONSTRUCTION VOLUME OF EACH TESTED GROUP
(SR MILLION)

Table 4.4 Cross Tabulation of the Number of Workers in Each of the Tested Groups.

FREQUENCY PERCENT ROW PCT COL PCT	>1000	500-1000	250-500	100 - 250	50-100	<50	TOTAL
GROUP ONE	7 10.29 36.84 63.64	9 13.23 47.37 52.94	1 1.47 5.26 5.88	2 2.94 10.53 14.28	0 0 0 0	0 0 0 0	19 27.94
GROUP TWO	4 5.88 14.82 36.36	5 7.35 18.52 29.41	9 13.23 33.33 52.94	7 10.29 25.93 50	1 1.47 3.70 16.67	1 1.47 3.70 33.33	27 39.91
GROUP THREE	0 0 0 0	3 4.41 13.63 17.65	7 10.29 31.82 41.18	5 7.35 22.73 33.72	5 7.35 22.73 83.33	2 2.94 9.09 66.67	22 32.35
TOTAL	11 16.18	17 25.0	17 25.0	14 20.59	6 8.82	3 4.41	68 100

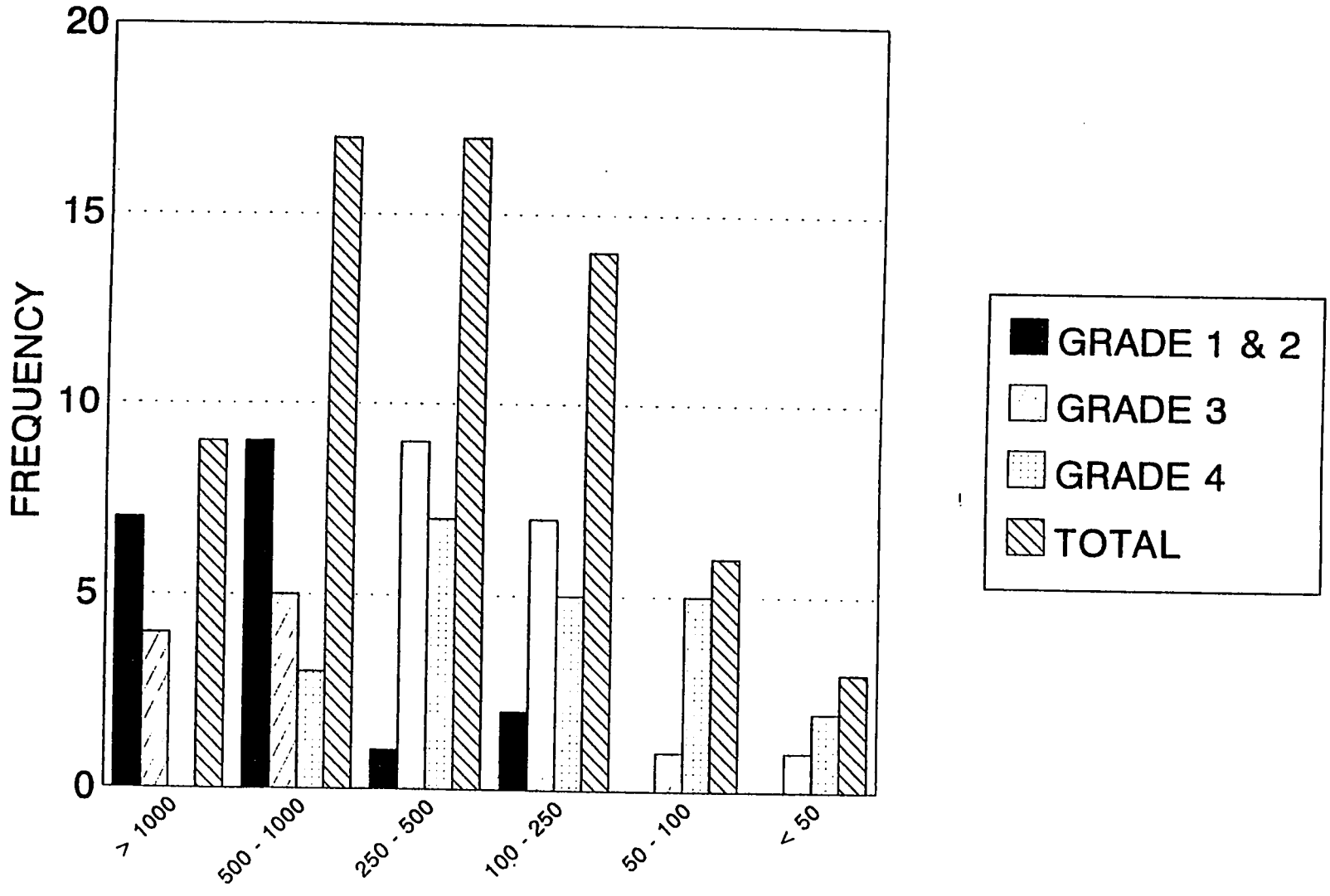


FIGURE 4.5 CROSS TABULATION OF NUMBER OF WORKERS IN EACH OF TESTED GROUPS

4.1.2 Statistical Techniques

Table 4.5 shows the statistical technique used to analyze the collected data. The purpose of this section is to present the techniques that aid the researcher in interpreting the existing information. This table contains the computation of the following statistics:

1. Mean= $X=\Sigma^{3}_{h=1} W_h \bar{X}_h$ (Eq. 4.1)

   where $W_h = N_h/N$, h =1,2,3

2. Standard Deviation = $S_x = (\Sigma^{3}_{h=1} W_h^{2} S_{hx}^{2})^{1/2}$ (Eq. 4.2)

3. The Standard Error of Mean= $S_{\bar{x}}=S_x/(N)^{1/2}$

   The standard error of mean is used to describe the deviation of sample means around their population mean.

4. 95% confidence interval = $\bar{X} \pm 1.96\ SE(\bar{X})$ (Eq. 4.4)

The fact that samples usually are not perfect replicas of the population from which they were drawn means that the researcher is never sure how close the sample value is to the population value. While sample data would not determine the exact population value, this data can be used to estimate a value or an interval which is considered to contain the population value. The sample value is called a point estimate and the interval is called a confidence interval and its size depends upon the agreement of confidence desired in the sample's results by the researcher.

The confidence coefficient used in this thesis is 95% when elsewhere mentioned. This means that if a large number of probability samples were taken, 95% of these samples would contain the actual mean of the universe within an interval of $\pm 1.96\ SE(\bar{X})$. For example, question No.6 in managerial causes has the following 95% confidence interval: 1.95 ±0.2.

So,

The lower limit (LL)=1.75

The upper limit (UL)=2.15

Table 4.5 Statistics of All Contractors

	Q #	MEAN	STANDARD DEVIATION	STANDARD ERROR OF MEAN	95% CONFIDENCE INTERVAL	COEFFICIENT OF VARIATION (CV)
MANAGERIAL	1	1.25	0.53	0.06	1.25±.13	42.32
	2	1.75	0.68	0.08	1.75±.16	38.71
	3	1.85	0.96	0.12	1.85±.23	51.77
	4	1.50	0.71	0.09	1.50±.17	47.14
	5	1.66	0.73	0.09	1.66±.17	44.02
	6	1.95	0.82	0.10	1.95±.20	41.88
	7	1.81	0.83	0.10	1.81±.20	46.06
	8	1.92	0.77	0.10	1.92±.19	40.36
	9	2.36	0.90	0.11	2.36±.22	38.04
	10	1.88	0.82	0.10	1.88±.20	43.68
	11	2.65	0.92	0.11	2.65±.22	34.69
	12	3.18	0.97	0.12	3.18±.23	30.45
	13	1.73	0.89	0.11	1.73±.21	51.33
	14	2.67	1.13	0.14	2.67±.27	42.29
	15	1.88	0.95	0.12	1.88±.23	50.72
	16	1.36	0.60	0.07	1.36±.14	43.84
—	—	———	———	———	———	———
FINANCE	1	1.87	0.79	0.10	1.87±.19	42.30
	2	1.73	0.62	0.08	1.73±.15	35.66
	3	1.43	0.65	0.08	1.43±.16	45.83
	4	1.78	0.88	0.11	1.78±.21	49.80
	5	1.97	0.85	0.10	1.97±.20	42.93
	6	2.46	0.93	0.11	2.46±.22	37.62
	7	2.76	0.99	0.12	2.76±.24	35.71
—	—	———	———	———	———	———
EXPANSION	1	2.48	0.86	0.11	2.48±.22	34.77
	2	2.88	0.79	0.10	2.88±.20	27.41
	3	2.55	1.00	0.12	2.55±.24	39.09
	4	2.07	0.96	0.12	2.07±.23	46.20
	5	2.15	0.79	0.10	2.15±.19	36.68
	6	1.75	0.79	0.10	1.75±.19	44.96
	7	3.20	0.82	0.10	3.20±.20	25.60
—	—	———	———	———	———	———
ENVIRONMENTAL	1	1.54	0.70	0.09	1.54±.17	45.76
	2	2.43	1.06	0.14	2.43±.27	43.71
	3	2.26	1.04	0.13	2.26±.26	46.02
	4	2.82	0.85	0.10	2.82±.21	30.04

According to the scale used in the analysis of data (see Figure 4.6), if the total population (85+160+207) were taken, 95% of these samples would contain the actual mean of the universe (1.95) which is approach to "Influence" response.

(1)	(2)	(3)	(4)
Very Influence	Influence	Slightly Influence	Not Influence

Figure 4.6 Scoring Scale

5. Coefficient of Variation

Coefficient of Variation (C.V.)= $S_x/\bar{X}*100$ (Eq. 4.5)

4.1.3 Correlation

Correlation (r) is used to find the relationship existing among different parties (Grade one and two, Grade three, and Grade four) and the degree of this relationship. There are three methods suitable for determining association among the parties included in this study. They are the Spearman correlation, partial correlation, and multiple correlation.

A. The Spearman correlation is used to find and compare how well any two parties agree while ignoring the third party completely. Table 4.6 shows the calculations used to find the agreement between any two parties. For example, the agreement between group two and four is 95% when group one are not considered. This confirms that there is a substantial correlation between the two parties.

Table 4.6 Spearman Rank Correlation

RANK BY				Difference Between (d/d^2)					
Q #	G 1&2 (1)	G 3 (2)	G 4 (3)	d_{12}	d_{12}^2	d_{13}	d_{13}^2	d_{23}	d_{23}^2
1	1	1	3	0	0	2	4	2	4
2	5.5	12.5	9.33	7	49	3.83	14.6689	3.17	10.0489
3	17	15.33	7	1.67	2.7889	10	100	8.33	69.3889
4	2	4	6	2	4	4	16	2	4
5	10.33	6	8	4.33	18.7489	2.33	5.4289	2	4
6	10.33	20	20.5	9.67	93.5089	10.17	103.4289	0.5	0.25
7	7.5	15.33	14.5	7.83	61.3089	7	49	0.83	0.6889
8	14.33	18	16	3.67	13.4689	1.67	2.7889	2	4
9	25.5	23	24	2.5	6.25	1.5	2.25	1	1
10	14.33	14	12.5	0.33	0.1089	1.83	3.3489	1.5	2.25
11	27	28.5	29	1.5	2.25	2	4	0.5	0.25
12	32	34	33	2	4	1	1	1	1
13	10.33	11	5	0.67	0.4489	5.33	28.4089	6	36
14	24	25.5	31.5	1.5	2.25	7.5	56.25	6	36
15	19	10	9.33	9	81	9.67	93.5089	0.67	0.4489
16	5.5	2	1	3.5	12.25	4.5	20.25	1	1
17	13	15.33	17.5	2.33	5.4289	4.5	20.25	2.17	4.7089
18	7.5	8	12.5	0.5	0.25	5	25	4.5	20.25
19	3	3	2	0	0	1	1	1	1
20	9	9	14.5	0	0	5.5	30.25	5.5	30.25
21	18	12.5	19	5.5	30.25	1	1	6.5	42.25
22	28	25.5	22	2.5	6.25	6	36	3.5	12.25
23	31	28.5	30	2.5	6.25	1	1	1.5	2.25
24	25.5	27	26	1.5	2.25	0.5	0.25	1	1
25	30	32	31.5	2	4	1.5	2.25	0.5	0.25
26	29	24	27	5	25	2	4	3	9
27	22	19	17.5	3	9	4.5	20.25	1.5	2.25
28	20	21	23	1	1	3	9	2	4
29	14.33	7	9.33	7.33	53.7289	5	25	2.33	5.4289
30	33	33	34	0	0	1	1	1	1
31	4	5	4	1	1	0	0	1	1
32	21	30	25	9	81	4	16	5	25
33	23	22	20.5	1	1	2.5	6.25	1.5	2.25
34	34	31	28	3	9	6	36	3	9

Σd^2 =	586.79	738.8323	347.4634
$6\Sigma d^2/(n^3-n)$ =	0.08965	0.112884	0.053088
r_s =	0.91034	0.887115	0.946911

Where:

$r_s=1-6\Sigma d^2/(n^3-n)$ n= 34

Therefore using the rank correlation coefficients, the agreement is:
= 0.91 between Grade one and two and group two
= 0.89 between group one and group three
= 0.95 between group two and group three

B. Partial correlation is used to find and compare how well any two parties agree while holding the third party constant.

The following equations are used for the calculations:

1. $r_{12.3} = (r_{12}-r_{13}r_{23})/ ((1-r_{13}^2)(1-r_{23}^2))^{1/2} =$

$(0.91-0.89*0.95)/((1-(0.89)^2)(1-(0.95)^2))^{1/2} = 0.4530$

2. $r_{13.2} = (r_{13}-r_{23}r_{12})/ ((1-r_{23}^2)(1-r_{12}^2))^{1/2} =$

$(0.89-0.91*0.95)/((1-(0.91)^2)(1-(0.95)^2))^{1/2} = 0.1970$

3. $r_{23.1} = (r_{23}-r_{12}r_{13})/ ((1-r_{12}^2)(1-r_{13}^2))^{1/2} =$

$(0.95-0.89*0.91)/((1-(0.89)^2)(1-(0.91)^2))^{1/2} = 0.7411$

where:

$r_{12.3}$ =the agreement between group one, and group two when group three rank is held constant.

$r_{13.2}$ =the agreement between group one, and group three when group two rank is held constant.

$r_{23.1}$ =the agreement between group two and group three when group one rank is held constant.

C. Multiple correlation is used to describe the extent of association between the parties when considering one is the main party with the others.

The following equations are used in calculations:

1. $R_{23.1} = [(r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23})/(1 - r_{23}^2)]^{1/2}$

$= [((0.91)^2 + (0.89)^2 - 2(0.91*0.89*0.95)/(1 - (0.95)^2)]^{1/2}$

$= 0.91$

2. $R_{2.13} = [(r_{12}^2 + r_{23}^2 - 2r_{12}r_{23}r_{13})/(1 - r_{13}^2)]^{1/2}$

$= [((0.91)^2 + (0.95)^2 - 2(0.91*0.89*0.95)/(1 - (0.89)^2)]^{1/2}$

$= 0.96$

3. $R_{3.12} = [(r_{13}^2 + r_{23}^2 - 2r_{12}r_{13}r_{23})/(1 - r_{12}^2)]^{1/2}$

$= [((0.89)^2 + (0.95)^2 - 2(0.91*0.89*0.95)/(1 - (0.91)^2)]^{1/2}$

$= 0.95$

where:

$R_{1.23}$ =the agreement between group one, and the other two parties (group two and group three).

$R_{2.13}$ =the agreement between group two and the other two parties (group one and group three).

$R_{3.12}$ =the agreement between group three and the other two parties (group one and group two).

Table 4.7 shows the results of these correlations in a table format. The results of these correlations are shown in Figures 4.7, 4.8, and 4.9

4.1.4 Ranking

As mentioned in the previous chapter (section 3.2), the use of a percentage and severity index (a weighed average) will simplify and reduce all numbers to a range from 0 to 100. Consequently, the data will be translated into standard form, with a base of 100, for relative comparisons.

There are four ranking tables presented in this chapter, namely group one, group two, and group three. The fourth table will express the opinion of all contractors. These are Tables 4.8, 4.9, 4.10, and 4.11 respectively. The severity index of all tested groups and all contractors for managerial causes is shown in figure 4.10. The severity index of all tested groups and all contractors for the finance, expansion, and environmental causes is shown in Figure 4.11.

Table 4.7 Rank Correlation Values

SPEARMAN	PARTIAL	MULTIPLE
$r_{12}=0.91$	$r_{12.3}=0.45$	$r_{1.23}=0.91$
$r_{13}=0.89$	$r_{13.2}=0.197$	$r_{2.13}=0.96$
$r_{23}=0.95$	$r_{23.1}=0.741$	$r_{3.12}=0.95$

SPEARMAN CORRELATION VALUES

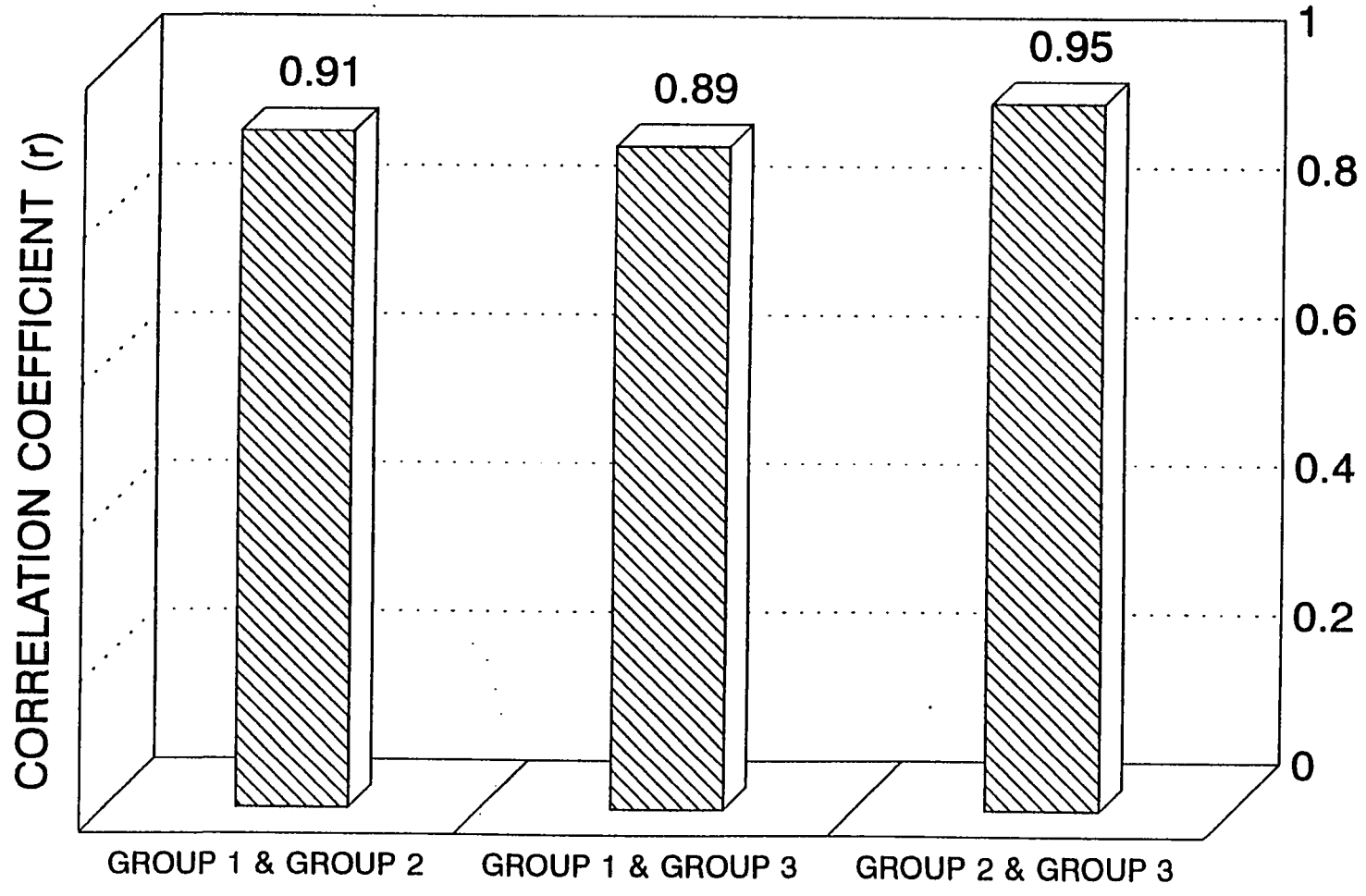


FIGURE 4.7 : THE AGREEMENT BETWEEN EACH TWO PARTIES

PARTIAL CORRELATION VALUES

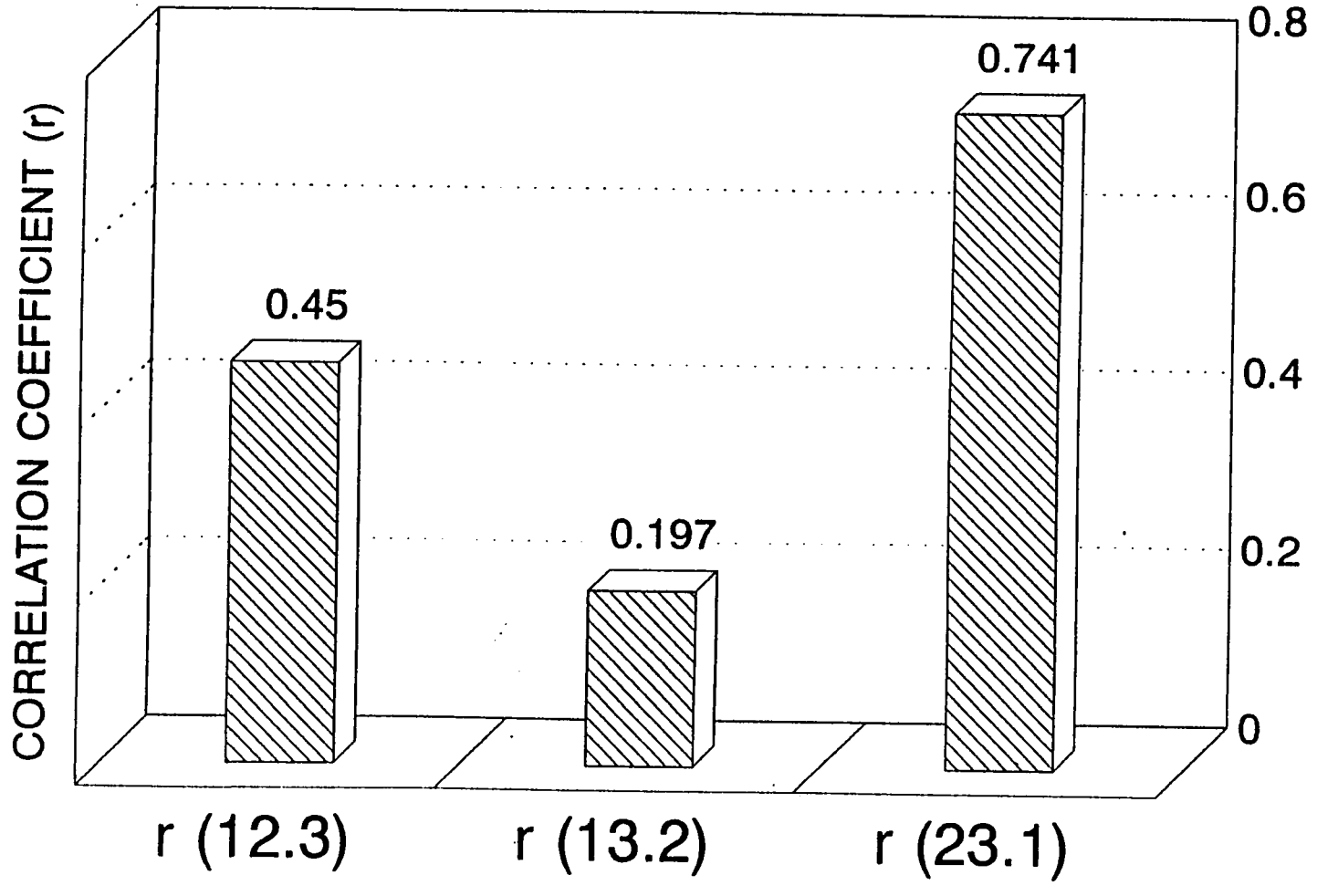


FIGURE 4.8 : THE AGREEMENT BETWEEN EACH TWO PARTIES WHERE OTHER ONE IS KEPT CONSTANT

MULTIPLE CORRELATION VALUES

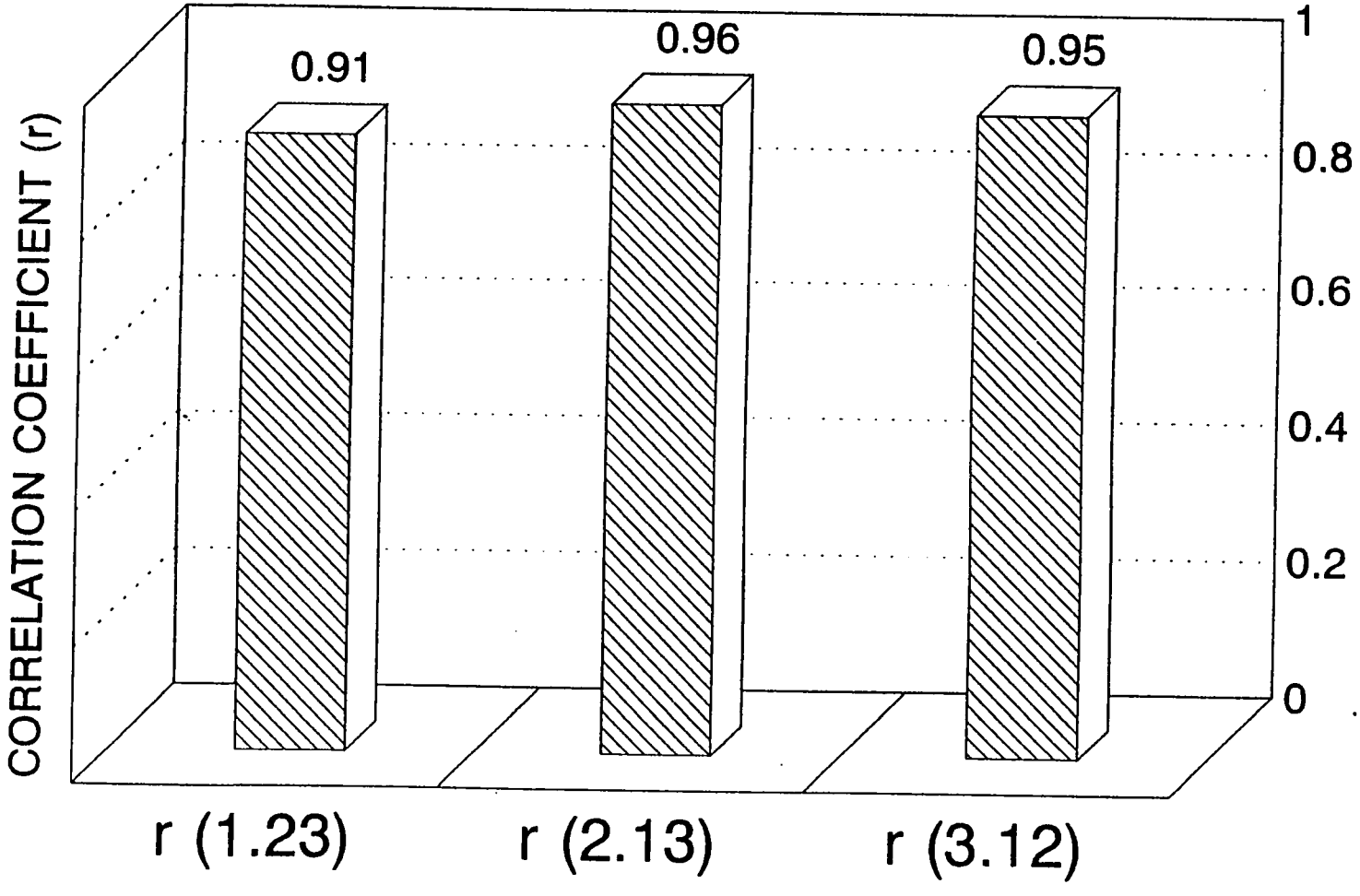


FIGURE 4.9 : THE AGREEMENT BETWEEN EACH PARTY AND OTHER PARTIES

Table 4.8 Grade One and Two Contractors (Group One)

OBS	FACTOR	SEVERITY INDEX
1	Lack of Managerial Experience in the Line of Work	96
2	Bad Decisions in Regulating Company Policy	84
3	Poor Estimation Practices	82
4	National Slump in the Economy	80
5	Neglect	79
---	---	---
6	Replace Key Personnel	79
7	Company Organization	77
8	Cash Flow Management	77
9	Bill and Collecting Effectively	74
10	Owner Absent from the Company	74
---	---	---
11	Labor Productivity and Improvement	74
12	Use of Project Management Techniques	74
13	Low Margin Profit Due to Competition	72
14	Internal Company Problems	68
15	Procurement Practices	68
---	---	---
16	Lack of Managerial Development or Maturity as the Company Grows	68
17	Assigning Project Leader in the Site	67
18	Controlling Equipment Cost and Usage	61
19	Frauds	61
20	Change in the Type of Work	59
---	---	---
21	Construction Industry Regulations in Saudi Arabia	55
22	Increased Size of Projects	54
23	Owner Involvement in Construction Phase	51
24	Using Computer Applications	51
25	Claims	50
26	Expanding into New Geographic Locations	50
27	Recruiting from One Country	44
---	---	---
28	Evaluate Project Profit in One Fiscal Year	42
29	Increased Number of Projects	41
30	Opening A Regional Office	38
31	Employee Benefits and Compensations	33
32	Recruiting Multinationals	30
33	Change from Private to Public	29
34	Bad Weather	23

Table 4.9 Grade Three Contractors (Group Two)

OBS	FACTOR	SEVERITY INDEX
1	Lack of Experience in the Line of Work	93
2	Neglect	92
3	Poor Estimation Practices	86
4	Bad Decisions in Regulating Company Policy	86
5	National Slump in the Economy	84
---	---	---
6	Labor Productivity and Improvement	83
7	Lack of Management Development or Maturity as the Company Grows	79
8	Cash Flow Management	76
9	Bill and Collecting Effectively	75
10	Frauds	73
---	---	---
11	Owner Absent from the Company	73
12	Replace Key Personnel	72
13	Controlling Equipment Cost and Usage	72
14	Internal Company Problems	70
15	Assigning Project Leader in the Site	70
---	---	---
16	Company Organization	70
17	Low Margin Profit Due to Competition	70
18	Procurement Practices	68
19	Increased Size of Projects	65
20	Use of Project Management and Techniques	65
21	Change in the Type of work	64
---	---	---
22	Owner Involvement in Construction Phase	55
23	Claims	54
24	Increased Number of Projects	54
25	Using Computer Applications	49
26	Evaluate Project Profit In One Fiscal Year	49
27	Expanding into New Geographic Locations	48
---	---	---
28	Recruiting from One Country	47
29	Employee Benefits and Compensations	47
30	Construction Industry Regulations in Saudi Arabia	47
31	Bad Weather	45
32	Opening A Regional Office	36
33	Change from Private to Public or Vice Versa	29
34	Recruiting Multinationals	23

Table 4.10 Grade Four Contractors (Group Three)

OBS	FACTOR	SEVERITY INDEX
1	Neglect	91
2	Poor Estimation Practices	88
3	Lack of Experience in the Line of Work	86
4	National Slump in the Economy	82
5	Owner Absent from the Company	82
---	---	---
6	Bad Decisions in Regulating Company Policy	79
7	Assigning Project Leader in the Site	78
8	Labor Productivity and Improvement	76
9	Frauds	76
10	Replace Key Personnel	76
---	---	---
11	Lack of Managerial Development or Maturity as the Company Grows.	76
12	Internal Company Problems	73
13	Cash Flow Management	73
14	Company Organization	73
15	Bill and Collecting Effectively	73
---	---	---
16	Procurement Practices	72
17	Low Margin Profit Due to Competition	71
18	Increased Size of Projects	71
19	Controlling Equipment Cost and Usage	68
20	Use of Project Management Techniques	67
21	Owner Involvement in Construction Phase	67
---	---	---
22	Evaluate Project Profit in One Fiscal Year	62
23	Change in Type of Work	61
24	Claims	59
25	Construction Industry Regulations in Saudi Arabia	57
26	Expanding into New Geographic Locations	54
27	Increased Number of Projects	48
---	---	---
28	Bad Weather	45
29	Recruiting from One Country	43
30	Employee Benefits and Compensations	41
31	Opening A Regional Office	38
32	Using Computer Applications	33
33	Recruiting Multinationals	30
34	Change from Private to Public or Vice Versa	21

Table 4.11 All Contractors

OBS	FACTOR	SEVERITY INDEX
1	Lack of Experience in the Line of Work	92
2	Neglect	88
3	Poor Estimation Practices	86
4	Bad Decisions in Regulating Company Policy	83
5	National Slump in the Economy	82
---	---	---
6	Labor Productivity and Improvement	78
7	Owner Absent from the Company	76
8	Cash Flow Management	76
9	Lack of Managerial Development or Maturity As the Company Grows	75
10	Replace Key Personnel	75
---	---	---
11	Bill and Collect Effectively	74
12	Company Organization	73
13	Assigning Project Leader in the Site	72
14	Low Margin of Profit Due to Competition	71
15	Internal Company Problems	71
---	---	---
16	Frauds	71
17	Procurement Practices	69
18	Use of Project Management Techniques	68
19	Controlling Equipment Cost and Usage	68
20	Increased Size of Projects	64
21	Change in the Type of Work	62
---	---	---
22	Owner Involvement in Construction Phase	58
23	Claims	55
24	Construction Industry Regulations in Saudi Arabia	52
25	Evaluate Project Profit in One Fiscal Year	51
26	Expanding into New Geographic Locations	50
27	Increased Number of Projects	48
---	---	---
28	Recruiting from One Country	45
29	Using Computer Applications	44
30	Employee Benefits and Compensations	41
31	Bad Weather	39
32	Opening A regional Office	37
33	Recruiting Multinationals	27
34	Change from Private to Public or Vice Versa	26

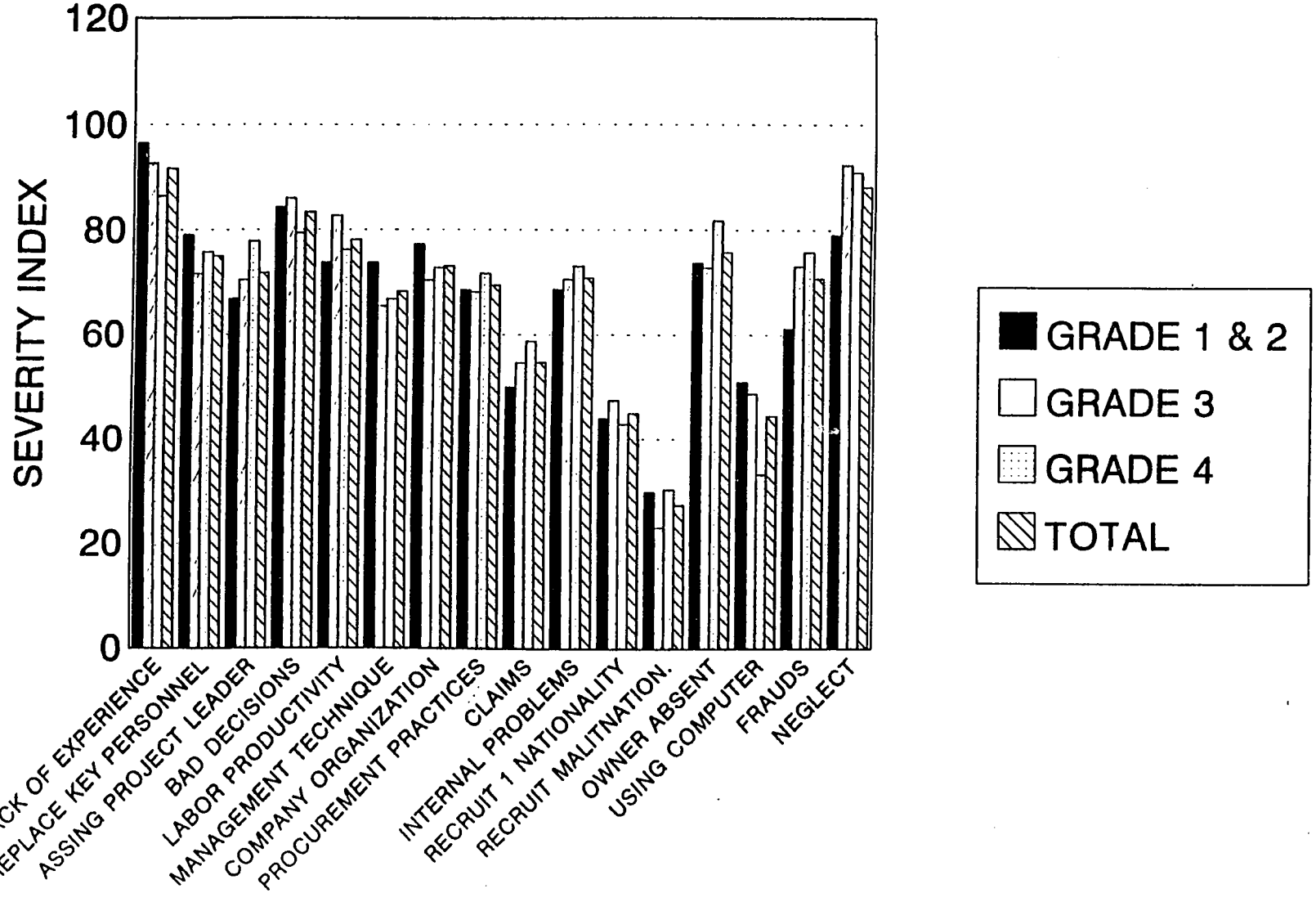


FIGURE 4.10 RANKING OF EACH TESTED GROUP AND ALL CONTRACTORS FOR MANAGERIAL CAUSES

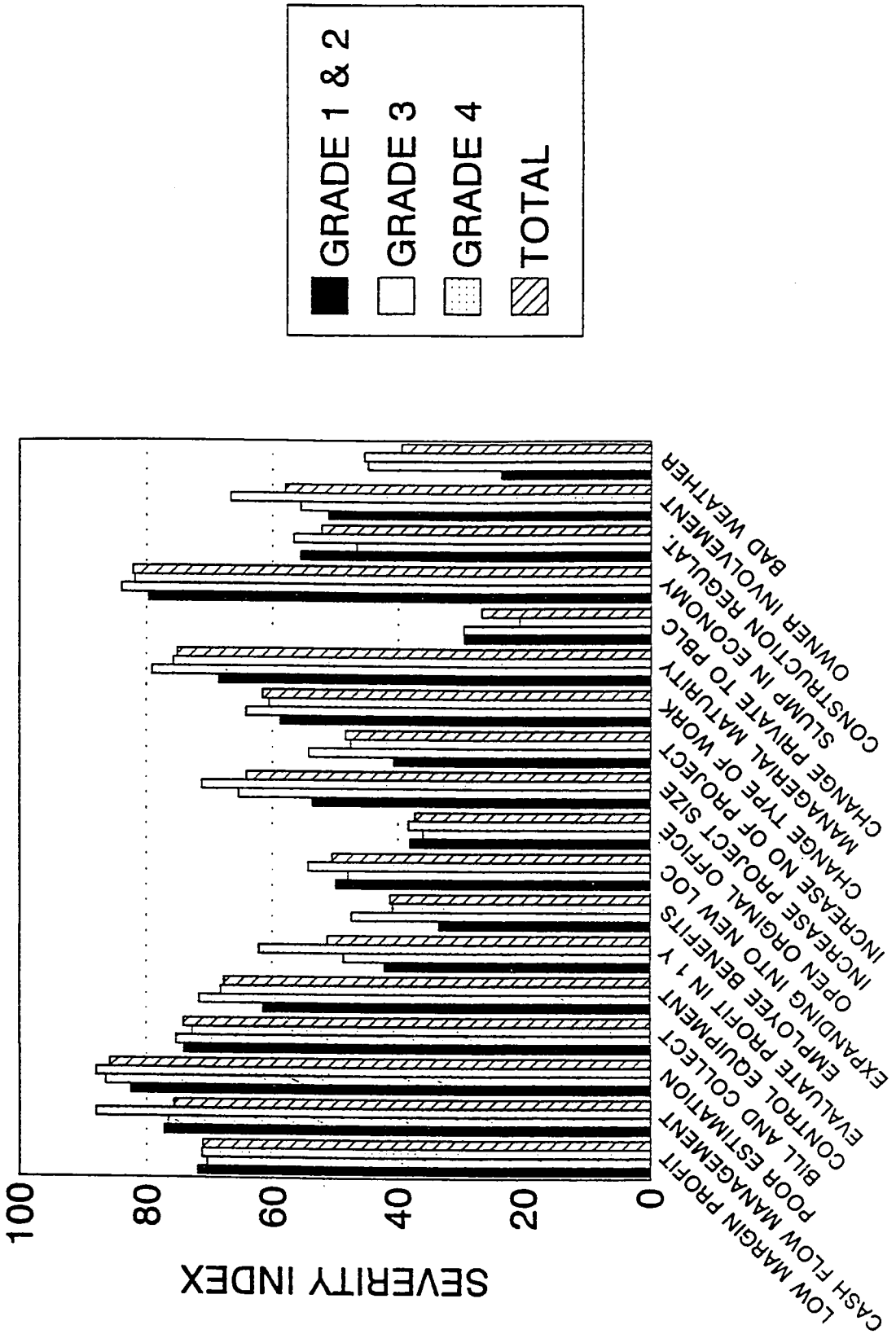


FIGURE 4.11 RANKING OF EACH TESTED GROUPS AND ALL FOR FINANCE, EXPANSION, AND ENVIRONMENTAL CAUSES

4.2 STATISTICAL RESULTS

There are three main statistical results.

4.2.1 Coefficient of Variation

Generally, data are considered to be homogeneous when the coefficient of variation (C.V.) is less than 10 %; however, the variation in the responses in this set is somewhat large. Thus, predictive values should be considered with care. Consequently, the results are applied only to the building and highway construction division.

4.2.2 Cross-Tabulation

There are four cross-tabulations in this section, namely speciality, experience, annual volume, and number of labors. These four tables are crossed with the grade of contractors. The fields of contractors, which is Table 4.1, shows that general construction, which is the highest, is 41% of the total samples. The second highest is highways, which is 25%. In the samples, there are contractors with one activity and multiactivities but none of these contractors works on the residential houses alone. The residential houses come with other activities. The percentage of contractors who have only one activity are 34% for general buildings, 16% for highways and 3% for heavy construction.

The percentage of contractors who have more than one activity is 45% of the total samples. Consequently, the study of failures of one activity or field will not give accurate results because most of the contractors have more than one activity and it will not be easy to separate the causes which influence each activity.

Table 4.2 shows experience crossed by the grade of the contractors. 91% of the contractors have more than 10 years' experience and 9% of the contractors have experience

between 3 to 10 years. The cross tabulation shows that 100 of group one contractors have more than 10 years' experience. About 92.59% of group two have 10 years or more, and 7.41% have 5 to 10 years. 81.82% of the group three contractors have 10 years of experience or more, 13.64% have 5 to 10 years' experience and 4.54% have 3 to 5 years of experience. The table shows that none of the contractors have fewer than 3 years of experience. The long experience will give the results more reliability. This figure shows that both group one contractors and group two contractors have more experience than group three. Consequently, their responses to the problems reflect the existing situations.

The cross tabulation of annual construction volume shows that the highest frequency is 10-50 million. The second highest frequency is 50-100 million. The least frequency, which is for group one, is 500 million or more. There is a greater percentage of contractors in group one than group two, and in group two than group three in the first three highest choice in the volumes. This is because when the grade becomes higher, the volume of the project is higher. Consequently, the annual volume of contractor becomes higher.

The cross tabulation of the number of workers shows 10.29% of the total of the group one contractors have more than 1000 workers, 13.23% have 500-1000 workers, and 4.41% have 250 workers or fewer. Consequently, the larger the annual volume, the more the number of workers. About 5.88% of group two contractors have 1000 workers or more, 7.35% have 500 to 1000 workers, 13.23% have 250 to 500 workers, 10.29% have 100 to 250 workers, and 2.94% have 100 workers or fewer. About 4.41% of group three contractors have 500 to 1000 workers, 10.29% have 250 to 500 workers, 7.35% holds true for both 100 to 250 and 50 to 100 workers, and 2.94% have 50 workers or fewer.

4.2.3 Correlation

The Spearman correlation table shows that the highest agreement is between the group two and the group three contractors (r_{23}=0.95). Because they have more competitors than the group one; thus the agreement between them is higher. The gap in the volume of one project between group one contractors and group two is much greater than the gap between group two and group three. This means that the agreement between group two and group three is higher. The agreement between group one and group two is (r_{12}=0.91), while the agreement between group one and group three is (r_{13}=0.89).

The partial correlation shows that when group one are kept constant, the agreement between group two and group three is the highest ($r_{23.1}$=0.7411). On the other hand, when group three is kept constant, the agreement between group one, and group two are ($r_{12.3}$=0.4530). This indicates that group three responses are more important than those of group one in reflecting the existing situations. The agreement between group one, and group three, when keeping group two constant, is the least ($r_{13.2}$=0.1970). This leads to the conclusion that group two responses are the most important in reflecting the existing situations. These results are emphasized by the multiple correlation where the highest is when the group two is considered with the two other parties ($r_{2.13}$=0.96). When the group three is considered with other parties, the result is ($r_{3.12}$=0.95). The least important is when considering the group one with other parties ($r_{1.23}$=0.91).

4.2.4 Test of Hypothesis

The researcher wants to test the hypothesis in group one, group two, and group three contractors to see if they generally agree on the severity of rank of failures. The t test is suitable in this study.

Test of the Correlation

This section tests the agreement between the parties and the differences in their responses.

The null hypothesis in section (1) below is tested by comparing the calculated value of t with the critical test value and the results is given in section (4) below.

1. On the severity rank of failures and they differ in their responses with a correlation of zero among them.

2. The calculated value of t

$$t = [(n-2)*r^2/(1-r^2)]^{1/2} \qquad \text{(Eq. 4.6)}$$

where

r= the Spearman correlation, partial correlation and multiple correlation found in Table 4.7.

n= the number of observations (the number of questions in this study). It is taken as ∞ to include any number of questions.

The t results are shown in Table 4.12 after substituting the r values present in Table 4.7.

3. The critical test value:

$$t_{0.05,\,\infty} = 1.645$$

4. Decision

In this case, the calculated values (see Table 4.12) are greater than the critical value (1.645).Therefore, the null hypothesis is rejected and it is concluded that the parties agree on the severity rank of failures and these parties are reliable in their responses.

Table 4.12 T- Values for Testing H_o

$t_{12}=12.42$	$t_{12.3}=8.94$	$t_{1.23}=12.42$
$t_{13}=11.04$	$t_{13.2}=2.56$	$t_{2.13}=19.39$
$t_{23}=17.21$	$t_{23.1}=6.24$	$t_{3.12}=17.21$

4.3 MAJOR FINDINGS

The major causes of contractor failures are divided into four major areas as discussed in chapter 2. The discussion of this section follows the organization used in chapter 2 with focus on the results obtained and presented in Tables 4.8, 4.9, 4.10, and 4.11. The average of each area was calculated, then the percentage of each area was calculated. The percentage of each area is 27.78% for managerial, 27.27% for finance, 23.70% for environmental, and 21.70% for expansion causes of failure. These percentages are shown in Figure 4.12.

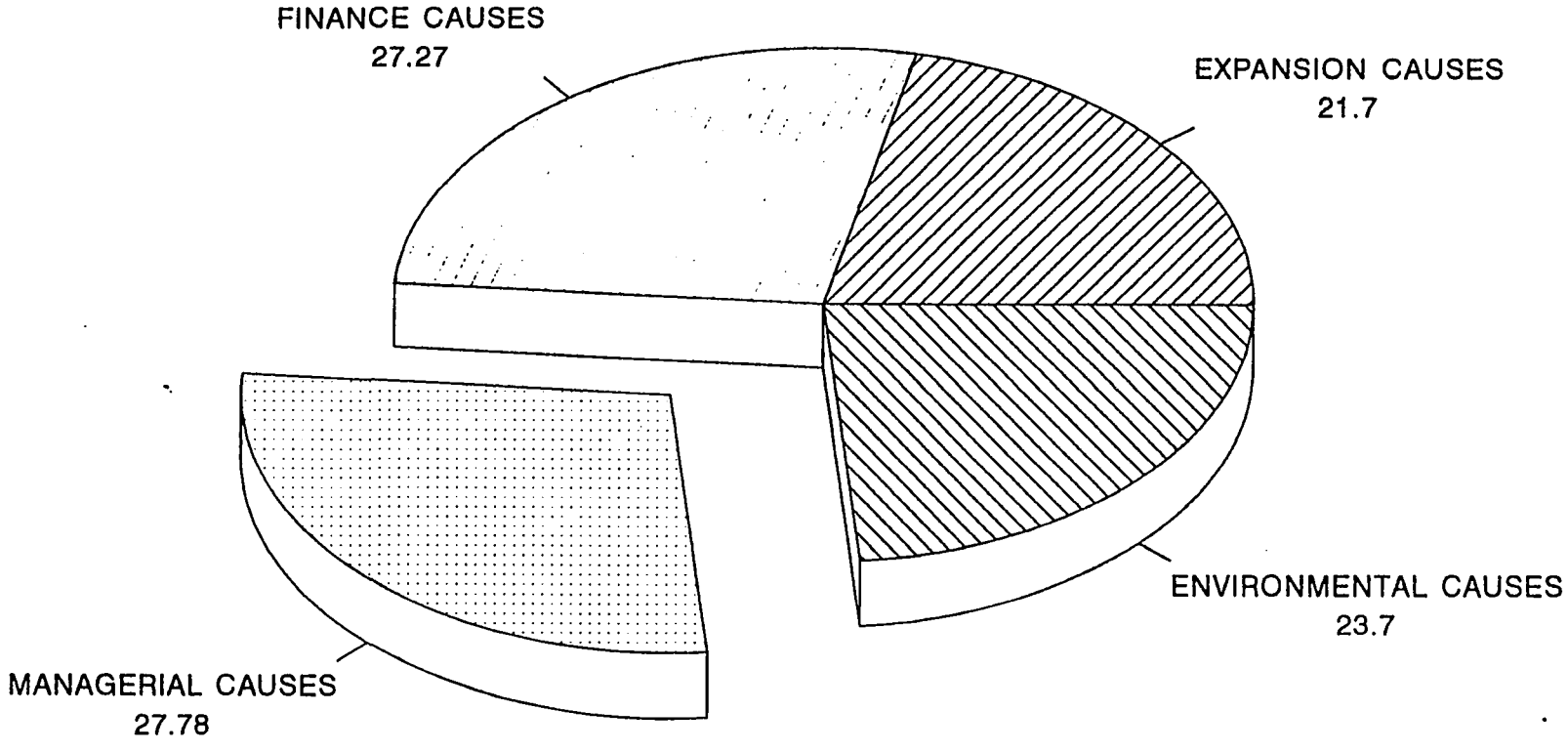


FIGURE 4.12 THE PERCENTAGE OF EACH TYPE OF CAUSES

The percentage of the managerial and finance causes are almost equal and the highest, but the expansion causes make the least contribution to the failures. The most important causes will be discussed in this section.

1 Lack of Experience in the Line of Work

Lack of experience is the most important cause of failure. Experience is not only important for management but also in every other part of the company from the owner to the laborers. The highest severity index in all tables is for group one . This is because the volume of projects for this group is more than 200 million which requires very high experience in executing projects. On the other hand, the volume of the project for group three is 15 million which requires little experience to execute projects.

This is the reason for getting the experience in the third highest in the group three contractors. Experience is very important for the owner because he is required to be realistic in estimating, planning, and managing. The owner of one of these respondent's company stated that he used to have 800 employees in 1985 but now he has only between 50-100 employees. He attributed this reduction to his initial low experience in dealing with managers, engineers, technicians, and labors on the site, and to his low experience in the market that made him unable to bid on a good basis. One of the grade one contractors stated that that the experience in the management team and also the qualification degree of the work team are very important in the company to avoid failure.

2 Neglect

The severity index of neglect is the second highest for all contractors. The severity index is the first in the group three, the second in the group two, and the fifth in the group one contractors. It is clear that when the severity index of neglect goes to the upper grade,

the volume decreases. Neglect in the upper grade is more costly than in the lower grade. So, the degree of awareness of neglect in the upper grade is higher.

3 *Poor Estimating Practices*

Survey results show that project cost estimation is a very important cause of failure. Poor estimating practices are given the third rank among all contractors. The owner of the company should contribute in preparing the bidding prices. The contractor should have records for all his competitors. The bid price in every project for all competitors should be studied to estimate their markup. After that, the contractor will have a general view about his competitors which could help him in preparing his bid. It is recommended that the consulting office who designs the project estimate the take off quantities for the materials needed in the project. This will help contractors to bid in known quantities.

4 *Bad Decisions in Regulating Company Policy*

Bad decisions is given in the fourth rank. The rank of this cause goes higher when the grade of contractors increases. To illustrate, the rank for this cause in group three is sixth, in group two is fourth, and in group one is second. This is because most of group one contractors have a policy which is decided by the board of the company. This policy determines the line of work for the company. Also, the policy will be reviewed regularly to be adapted with the economy situation. Group one contractors feel how important the company's policy is compared to other parties. Making decisions should not be determined by one man. All involved parties should contribute to this decision. This will give each party more loyalty in applying the decision. Many companies have lost their business because of one bad decision in regulating company policy.

5 *National Slump in the Economy*

The country's economy is very important to help contractors to run their businesses. A national slump in the economy is given the fifth rank. This proves what was mentioned in section 1.2. The international recession which affected Saudi Arabia's economy had influence on contractor failures. This is because the construction industry is more sensitive to economic cycles. The economic cycle is a period of time in which boom years are followed by depression years. The economic cycle is about 15-20 years. When the boom years start, most people will be encouraged to invest their money. Most investment needs construction, for example hospitals, commercial buildings, factories, and compounds. On the other hand, when the depression years start, people will keep their money to see to what level the depression will go. For example, people who are living in rented houses who want to construct a new house would not risk spending money in depressed time. Also, investors may not start any new project when the future is uncertain. Depression years will affect directly the construction industry. Thus, contractors should always read economic magazines to update his information about the economic situation in the country.

6 *Labor Productivity and Improvement*

Since the productivity and improvement of laborers are given sixth rank, contractors should give this cause very high priority. Low productivity means high cost which could cause failure. It is very important to know what is the proper way for encouraging the laborers because laborers might be encouraged by money, promotions, gifts, or by better living situations. The rank of productivity and improvement is higher for group three and group two than for group one. So, the problem of productivity is more serious in the lower grade than the higher grade because the benefits and compensations in group one which have large number of laborers is more systematic than in group two and four. This means

that group one do not feel that productivity is a problem with them. Using scheduling and planning in group one is very important because these grades are dealing with very high volume . This will help the management to monitor productivity while they are following the progress of the construction.

7 *Owner Absent from the Company*

Survey results unfortunately show that the owner's absence from the company is an important cause of failures. It is given the seventh rank. It was stated early that the owner's experience is very important. Now the situation is very complicated since the owner is not following his business. The rank of this cause in group three is fifth, while the rank in the group one, and group two are eleventh and tenth respectively. Even though the absence of the owner could cause failure, it is less serious in group one because this group is more organized and systematic than the other two groups. When the project volume is very high, it needs more activities and different levels of management. Therefore, the owner's duty is less. This is the reason for getting the rank of the company organization in the group one is seventh, while in group two is sixteenth and in group three is fourteenth.

The organization chart for group one would represent large sized firms, as shown in Figure 2.2, but the organization for group two and group three would represent medium sized firms. The organization chart for large sized firms have different levels of management which decrease the responsibilities of the owner.

8 *Collecting and Managing Cash Flow*

Delay in receiving the payable amount for the contractor is the financial problem which most often causes failure. In public work, the procedure for getting payment is a very

long routine which requires the contractor to use his cash flow or get a loan from the bank. This will add more cost to the project.

Most of the projects in private work are over estimated, which embarrasses the owner in paying contractors. In this case, owners always try to make excuses for delaying the payments. The cash flow management is very important for the contractor. This cause is given the eighth rank among all responses. A contractor should know where he brings money from and where the money is spent or he could be run out of the business. The rank of group one is higher than the rank of group three for cash flow management. Because the volume of group one projects is much higher than group three, the progress payment will be less and more critical. So, the progress payment for group one is more serious than for group three. This proves what was discussed before, that increasing project size will cause problems in progress payments which could cause a contractor's failure.

9 *Lack of Managerial Maturity*

The lack of managerial maturity or development as the company grows is given the ninth rank among all contractors. The rank of lack of managerial maturity for group one is sixteenth, for group two is seventh, and for group three is eleventh. The group one contractors are tremendous companies which have more than 500 workers. These companies have been developed until they have become these large sized companies. So, they have passed this problem and they do not feel this cause of failure. They need to preserve this level. The gap between group one and group two is 150 million. The group two contractors need to grow almost three times to be able to reach the next grade. So, their feeling about this problem is more than for any other grade. The gap between group two and group three is 35 million. So, the growth for getting the next grade is not as much problem as in the case of group two. This is the reason for getting rank for the managerial

maturity in group three is lower than group two. Company growth is natural, but the company should mature while it is developing to avoid failure.

10 Replacement of Key Personnel

The successful companies should preserve their key personnel or they might be exposed to risks. This cause is given the tenth rank. The company could reach the peak easily, but it is very difficult to stay there. This is much possible, however, when the company always trains new employees to replace any vacancies. The rank of the three groups shows that this cause is more influential in group one. This is because the key personnel in group two and group three are three to five, but in group one the number will be more. So, the vacancies in group one are more frequent and the cause would be more influential than for the other groups.

11 Assigning Project Leader in the Site

Assigning a project leader on the site could save money and time and reduce the risks of failure. Assigning a project leader on the site is given the thirteenth rank. The rank for group one is seventeenth, for group two is fifteenth and for group three is seventeenth. The projects for group one are very big and they need not only a project leader but also a site office which contains different divisions to supervise the huge activities on the site. So, this factor is not a serious problem for group one contractors. The projects for group three are very small, requiring one engineer to follow the work on the site. Since the duties for the project leader are very important, he should be qualified to handle them.

12 Low Margin of Profit Due to Competition

The survey results shows that the low profit margin due to competition is a very important cause of failure. This cause is given the fourteenth rank. One respondent said that

the increase in the number of small contractors and the unrealistic pricing of others could cause failures. Competitions have become part of the construction industry. Contractors should know before they start that they are in the most competitive area in all business. Contractor must think how to execute the project at the lowest cost. This could be done using the latest technical methods in construction.

13 Construction Industry Regulations in Saudi Arabia

Survey results show that construction industry regulations in Saudi Arabia are an important cause of failure. The construction industry is open to anyone. This will allow many unqualified contractors into the business. The contractor should have experience or he should attend a course to be qualified for the construction business.

In the Ministry of Housing and Public Works classification, the range of volume for each grade is not fairly distributed between the different grades. Also, the classification should be based on a site visit to the contractor. Every two years, the contractor must update his grade or he may be suspended until he shows up. The regulation does not have strong punishment for the laborer who cause failure to the contractor. Many laborers are trained by the contractors, then they request to leave the country.

Most contractors complain about the delay in receiving payment which usually disturbs them in running their businesses. The contracts should be reviewed and approved by third party either the government, a legal office or a consultant office to avoid problems which usually cause failure.

14 Other Causes Specified and Comments

The causes which are specified by the respondents are listed below:

Lack of relationship between the management and labor force,tendency to recruit low payment, recruitment procedures and options, good name in the market, project follow up, and low company capital.

The comments which are specified by the respondents are listed below:

1. When the project cost estimation is more than the owner's budget, the owner will give the lowest price, even though the owner knows that the price will cause the contractor to fail.

2. Comparison should be conducted among companies active in the same territory and similar fields.

3. Proper planning for the future even though there is loss at the beginning is the key for the company's success.

4. Allowing the business contractors who are not qualified managerially and technically to enter caused failure because of their low prices and consequent low quality.

4.4 SUMMARY

This chapter is intended to give the reader an idea of how the collected data was placed into a format that could be analyzed. This included the analysis of the raw data and a look at each group of the collected data separately to find the major points they contain. The chapter contains the statistical results, the statistical methods used, tables, diagrams, and information induced from statistical analysis and an interpretation of the tables and information.

As part of the analysis, ranking according to a severity index of the causes of failures by group one, group two, and group three is given in formatted tables and diagrams. A hypothesis was offered and tested that the three groups generally agree on the severity rank of failures and it was proved the hypothesis is true.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS.

This chapter is devoted to a summary, conclusion and recommendations.

5.1 A SUMMARY OF THIS RESEARCH

Chapter 1 gave a background about contractors' failures. In addition, the chapter introduced the objectives, previous studies done, the approaches and the significance of this study. It was decided that failures are considered to be an important field of study for future improvement in the construction industry.

Chapter 2 discussed the causes of failures among contractors. The causes which are related to building and highway contractors are discussed in this study. There are thirty four causes of failures which were combined into four areas. The causes of failures which were considered in the questionnaire were related to the following ares: management, finance, expansion, and environmental.

Chapter 3 demonstrated the means for collection of the raw data and then an approach was developed which resulted in the final questionnaire. Statistical sample size and scoring techniques were presented in this chapter.

Chapter 4 included the analysis of raw data and looked at each question in the questionnaire separately to find the major points they contained. Mainly, it contained the statistical methods used, tables, diagrams and information included for the statistical analysis and the statistical results, and an interpretation of these tables and this information.

The hypothesis of the agreement in the rank of the causes was tested, it was proven that the separate parties (group one, group two, and group three) generally agree.

5.2 CONCLUSIONS

Based on the above information, the following conclusions can be drawn:

1. Insufficient experience in the line of work is the main important cause of failure. Experience is important for all different levels of management because the construction industry is very complicated and it needs awake management to run the business. Not only is the experience of the owner in the business very important, but also his existence in the company is important. The owner's experience could lead the company to success because he would be able to prepare an accurate bid, do a realistic plan, be fair in managing, and be logical in judging.

2. Poor estimation practices are a major source of failure. The proper use of new methods for estimating cost would help to reduce failure. The owner is required to contribute in preparing the final price of the bid to share the responsibility.

3. One of the major causes of failure is that there is no restriction on those entering the construction market; anyone could become a contractor. As a result, unqualified contractors enter the business. This could decrease the quality of work and prices will be unrealistic. Consequently, the number of failures increases.

4. The economic impact and shortage of money in past years have resulted in an increased number of failures. The profit margins have become very small and very difficult to maintain.

5. Delays in payment are the main cause of failures because they result in a financial problem to the contractor. This may cause a cash flow problem to the contractor. Contractors cannot pay suppliers, workers, rents, and subcontractors. Consequently, this may stop the work and cause failure.

6. The study shows that the three parties (group one, group two, and group three) generally agree in the rank of failure. The grade three contractors are considered to be the party most influencing failure while grade four is the second. As a result, these two parties have the highest agreement.

7. Labor productivity and improvement is another cause of failure. The more labor productivity there is the less the total cost of the project. There are many ways for improving productivity, but the contractor chooses the appropriate methods for his business.

8. Bad decisions in regulating company policy is a source of failure. This cause could increase failure in the companies which there is "one man role". When decisions come from committee, the decision would consider all significant factors and the results will be satisfactory from all view points.

9. Neglect is an important cause of failure. Neglect may add extra cost to the project which could cause a failure. Customers do not like to do work with contractors who are negligent in their work. This could cause the contractor to be forced out of business.

10. Lack of managerial maturity as the company grows could cause a failure. This cause is more influential in grade three and grade four contractors because they manage small companies and are looking to become bigger. Grade one and two managements deal with projects of 200 million and above, so the managements are developed and the managerial maturity is not a serious problem for them.

5.3 RECOMMENDATIONS

5.3.1 General Recommendations

1. It is recommended that a set of procedure be established to restrict the construction industry. One of the set procedures is the restriction of owner. The owner of the company should be qualified much as a lawyer or an engineer is.

2. Contractors should improve the practices for calculating the project cost. A contractor may request the owner to provide him with take off quantities which are prepared by the design office. These quantities would be more accurate because the designer knows more about the project.

3. It is recommended that the number of payments increase to reduce the amount of each. Also, the contractor should include extra charges for late payments.

4. In each company, there should be two committees. The first committee would be for determining company policy and making the major decisions which are related to the company 's organization. The second committee would be for managing the cash flow in the company.

5. It is recommended that each contractor establish a program for motivating workers. This program should be designed to cover as many workers as

possible. The performance measures are an important factor for evaluating workers. Also, the financial compensation in the program has to be guaranteed in hourly wages or bonuses proportional to salary.

6. Contractor development should be done with a long term planning. The development plan should determine the expansion rate, managerial maturity and the income from the expansion. The plan should be reviewed every year, so that the contractor can decide whether to continue or to stop.

5.3.2 Recommendation for Future Research

The results of this research suggest the following areas which could be studied in future research:

1. The effect of the owner of a project on the failure of Saudi contractors.

2. The effect of government regulations on the construction industry.

3. Construction company organization structures and their policies.

4. Government policies that can be initiated in Saudi Arabia to help contractors stay in the business.

5. The effect of the owner of a company on the failure.

REFERENCES

1. Adrian, J.J., Business Practices for construction Management, Elsevier, New York, 1976.

2. Adrian, J.J., Construction Estimation, Prentice-Hall, New Jersey, 1982.

3. Al-Khaldi, A., The Labor Problems and Past Mistakes are Still Existing, Al-Yawm Newspaper, April 26, 1993.

4. Al-Msaid, A., The Effect of Owners Involvement on Projects Quality, Thesis Proposal, Dhahran, May 31, 1989.

5. Al-Turkistani, A. Q., Causes of Business Failure Among Saudi Contractors, Senior Thesis II, Dhahran, April 30, 1990.

6. American Society of Civil Engineers (ASCE) Manual, Quality in the Constructed Projects, Vol. 1, New York, 1988.

7. Argenti, John, Corporate Collapse, The Causes and Symptoms, McGraw-Hill Book Company, U.K., 1976.

8. Avots, I., "Why does Project Management Fail?" California Management Review, Vol. XII, 1969, pp. 77-82.

9. Baker, B.N., Murphy, D.C., and Fisher, D. "Factors Affecting Project Success." Project Manag. Handbook, 2nd Edition, New York, 1988, pp. 902-919.

10. Beckman, R. "Tall Building & Urban Design Consideration for Arid Regions," Proceedings of a Seminar, UPM Press, Dhahran, Saudi Arabia, pp. 263-279, November, 1984.

11. Berenson, M.I., Levine, D.M., Statistics for Business and Economics, Second Edition, Prentice-Hall, Englewood Cliffs, New Jersey, 1993.

12. Cori, K.A., "The Project Team: Vehicle for Reaching the Project Goals", Project Management Institute, October 1987, pp. 167-172.

13. Clough, R.H., Construction Project Management, John Willey & Sons, New York, 1972.

14. Drewin, F., Construction Productivity, Elsevier, New York, 1982.

15. Emory, C., Business Research Methods, 3rd Edition, Richard D, Irwin, Inc., Homewood, Illinois, 1985.

16. Kungari, R., Business Failure in Construction Industry, Journal of Construction and Engineering Management, VII4, No.2, 1988.

17. Ministry of Municipalities and Rural Affairs, Annual Report, Riyadh,1410 A.H.

18. Oglesby, C., Parker, H., Howell, G., Productivity Improvement in Construction, McGraw-Hill, 1989.

19. Pinto, J.K., and Slevin, D.P., "Critical Factors in Success Project Implementation," IEEE Trans. Eng. Manag. Vol. EM-34, 1987. pp. 22-27

20. Pinto, J.K., and Mantel, S.L., Mantel,Jr. "The Causes of Project Failure," IEEE Trans. Eng. Manag. Vol. 37, No.4, November 1990.

21. Schleifer, T.C., Why Some Contractors Succeed and Some do not, Concrete Const. June, 1989.

22. Schleifer, T.C., Construction Contractor's Survival Guide, John Willey & Sons, New York,1990.

23. Saudi Arabian Monetary Agency, Statistical Summary, Riyadh, 1403 A.H.

24. Saudi Arabian Monetary Agency, Annual Report, Riyadh, 1397 A.H.

25. Thorndike, G.L., Burnhart, C.L., Advanced Dictionary, Scott, Foresmen and Company, Glenview, 1979.

26. Walpoke, R., Myers, E., Probability and Statistics for Engineers and Scientists, 2nd Edition, MacMillan Publishing Co., Inc., New York, 1972.

APPENDICES

APPENDIX-I

QUESTIONNAIRE

1. Arabic Form

2. English Form

بسم الله الرحمن الرحيم

وزارة التعليم العالي

جامعة الملك فهد للبترول و المعادن

كلية تصاميم البيئة

برنامج هندسة وإدارة التشييد

Ministry of Higher Education

King Fahd University of Petroleum & Minerals

COLLEGE OF ENVIRONMENTAL DESIGN

Construction Engineering & Management Program

السادة /

السلام عليكم و رحمة الله و بركاته و بعد ..

نرفق لكم بطيه هذه الرساله استبيان يهدف الى معرفة اهم العوامل التي تسبب فشل المقاولين في حقل المباني بصفه عامه بالمملكة.

هذا و سوف تحلل نتائج هذا الاستبيان بواسطه الحاسب الآلي وتستخدم في الدراسه التي يقوم بها الطالب عادل عبد العزيز البراك لنيل درجه الماجستير في هندسه و اداره التشييد و التي ارجو ان تفيد الاشخاص و الجهات ذوى العلاقه في المستقبل.

ارجو التكرم بتعبئه هذا الاستبيان بالمعلومات الدقيقه و كذلك اضافه عوامل أخرى او ملاحظات شاكراً لكم تعاونكم. كما يسرني موافاتكم بنتائج هذا البحث عند انتهائه على عنوانكم المكتوب في هذا الاستبيان و لكم جزيل الشكر.
الرجاء ارسال الاستبيان على العنوان الموضح ادناه.

مقدمه

د. سعدي عبد العفو عساف

أستاذ مشارك؛ هندسه و اداره التشييد

صندوق بريد - ٨٠٨٠

الرمز البريدي ٣١٣١١

الظهران

ان هذه الدراسه تشمل جميع مقاولين المملكة المصنفين لدى وزاره الاسكان والاشغال العامه من الدرجة الرابعة فما فوق . لذا نامل تعبئه الاستبيان بأختيار الاجابه المناسب فيما يتعلق بشركتكم :-

١) ضع دائره على مجال العمل في البناء:
(أ) مقاول مباني السكنيه
(ب) مقاول مباني عامـــه
(ج) مقاول طرق
(د) مقاول مباني ضخمه
(هـ) مجالات أخرى فضلاً أذكرها : _____

٢) ضع دائره على جنسيه الشركة:
(أ) سعـوديـــه
(ب) سعوديـه - سعوديه مشاركه
(ج) سعوديه - اجنبيه مشاركـه
(د) غيـر سعوديـــه

٣) ضع دائره على عدد سنوات الخبره في مجال البناء:
(أ) اقل من سنه
(ب) من سنه الى ثلاث سنوات
(ج) من ثلاث الى خمس سنوات
(د) من خمس الى عشر سنوات
(هـ) اكثر من عشر سنوات

٤) ضع دائره على حجم العمل السنوي بالريال السعودي:
(أ) اكثر من ٥٠٠ مليون
(ب) من ٢٥٠ الى ٥٠٠ مليون
(ج) من ١٠٠ الى ٢٥٠ مليون
(د) من ٥٠ الى ١٠٠ مليون
(هـ) من ١٠ الى ٥٠ مليون
(و) اقل من ١٠ مليون

٥) ضع دائره على عدد العماله في الشركه:
(أ) اكثر من ١٠٠٠ عامل
(ب) من ٥٠٠ الى ١٠٠٠ عامل
(ج) من ٢٥٠ الى ٥٠٠ عامل
(د) من ١٠٠ الى ٢٥٠ عامل
(هـ) من ٥٠ الى ١٠٠ عامل
(و) اقل من ٥٠ عامل

٦) ضع دائره على اعلى درجة تصنيف في مجالات البناء حسب تصنيف وزاره الاسكان والاشغال العامه :
(أ) اولى
(ب) ثاني
(جـ) ثالث
(د) رابع

٧) بناء على خبرتكم في اعمال البناء ما مدى تأثير كل من هؤلاء الاسباب في فشل المقاول : -

أ) اسباب اداريه

	مؤثر جداً	مؤثر	مؤثر قليل	غير مؤثر	لا يوجد جواب
- قله الخبره في مجال اعمال البناء	[ ]	[ ]	[ ]	[ ]	[ ]
- استبدال الاداريين الناجحين	[ ]	[ ]	[ ]	[ ]	[ ]
- تعين مشرف مشروع في الموقع	[ ]	[ ]	[ ]	[ ]	[ ]
- القرارات الخاطئه في تنظيم سياسه الشركه	[ ]	[ ]	[ ]	[ ]	[ ]
- انتاجيه العمال و تطويرها	[ ]	[ ]	[ ]	[ ]	[ ]
- استخدام تقنيه ادارة المشاريع	[ ]	[ ]	[ ]	[ ]	[ ]
- تنظيم الشركـه	[ ]	[ ]	[ ]	[ ]	[ ]
- تطبيقات توظيف المواد	[ ]	[ ]	[ ]	[ ]	[ ]
- الشكاوي ضد الشركه	[ ]	[ ]	[ ]	[ ]	[ ]
- المشاكل الداخليه في الشركه	[ ]	[ ]	[ ]	[ ]	[ ]
- توظيف عمال من بلد واحد	[ ]	[ ]	[ ]	[ ]	[ ]
- توظيف عمال من جنسيات مختلفه	[ ]	[ ]	[ ]	[ ]	[ ]
- غياب المالك عن الشركه	[ ]	[ ]	[ ]	[ ]	[ ]
- استخدام تطبيقات الكومبيوتر	[ ]	[ ]	[ ]	[ ]	[ ]
- السـرقات	[ ]	[ ]	[ ]	[ ]	[ ]
- الاهمـال	[ ]	[ ]	[ ]	[ ]	[ ]

	مؤثر جداً	مؤثر	مؤثر قليل	غير مؤثر	لا يوجد جواب
ب) اسباب ماليـــه					
– تدني الربح بسبب المنافسه	[ ]	[ ]	[ ]	[ ]	[ ]
– اداره السيوله النقديه	[ ]	[ ]	[ ]	[ ]	[ ]
– ضعف في تقنيه تقدير المشاريع	[ ]	[ ]	[ ]	[ ]	[ ]
– أستيفاء المبالغ بسرعه و فاعليه	[ ]	[ ]	[ ]	[ ]	[ ]
– تحكم في قيمه و استخدام المعدات	[ ]	[ ]	[ ]	[ ]	[ ]
– تقيم ربح المشاريع في سنه ماليه	[ ]	[ ]	[ ]	[ ]	[ ]
– حقوق و تعويضات الموظفين	[ ]	[ ]	[ ]	[ ]	[ ]
ج) اسباب توسعيـه					
– تضخم في منطقه جغرافيه جديده	[ ]	[ ]	[ ]	[ ]	[ ]
– فتح مكتب أقليمي جديدلشركه	[ ]	[ ]	[ ]	[ ]	[ ]
– زياده عدد المشاريع لدى المقاول	[ ]	[ ]	[ ]	[ ]	[ ]
– زياده حجم المشاريع عن المعدل	[ ]	[ ]	[ ]	[ ]	[ ]
– تغير مجال تخصص المقاول في البناء	[ ]	[ ]	[ ]	[ ]	[ ]
– ضعف في توافق تطور العمل مع الاداره	[ ]	[ ]	[ ]	[ ]	[ ]
– تغير من عمل حكومي الى خاص او العكس	[ ]	[ ]	[ ]	[ ]	[ ]
د) اسباب بيئـــه					
– هبوط في الحاله الاقتصاديه في البلاد	[ ]	[ ]	[ ]	[ ]	[ ]
– نظام المقاولات في المملكه	[ ]	[ ]	[ ]	[ ]	[ ]
– عدم مشاركه المالك في التنفيذ	[ ]	[ ]	[ ]	[ ]	[ ]
– سـوء الطقس	[ ]	[ ]	[ ]	[ ]	[ ]
هـ) اسباب أخرى : ـ					
ـ _____	[ ]	[ ]	[ ]	[ ]	[ ]
ـ _____	[ ]	[ ]	[ ]	[ ]	[ ]
ـ _____	[ ]	[ ]	[ ]	[ ]	[ ]
ـ _____	[ ]	[ ]	[ ]	[ ]	[ ]

ملاحظات : _____

_____

_____

بسم الله الرحمن الرحيم

Ministry of Higher Education
King Fahd University of Petroleum & Minerals
COLLEGE OF ENVIRONMENTAL DESIGN
Construction Engineering & Management Program

وزارة التعليم العالي
جامعة الملك فهد للبترول والمعادن
كلية تصاميم البيئة
برنامج هندسة وإدارة التشييد

Dear Respondent:

The construction Engineering and Management of the College of Environmental Design at King Fahad University of Petroleum and Minerals is presently engaged in the study of causes of contractors failures in Saudi Arabia. This study is part of the Master thesis for Adel Abdulaziz Al Barrak.

We would like you to fill in this questionnaire based on your experience in the construction industry. The results of the questionnaire will be analyzed statistically. We would be happy to provide you with the results of the study.

Your assistance in filling in this questionnaire and adding any other causes or comments will be appreciated. Please return the completed questionnaire to the adress shown below.

Sincerely your:

Dr. Sadi Assaf, Associate Professor
Construction Engineering & Management

P. O. Box 8080
Dhahran 31311
Tel 873-4768

3c

This study will include all kingdom's contractors who are classified in the Ministry of Housing and Public Works form grade four and above. You are kindly request to answer these quesions regarding your firm:

I. Circal one of the following to indicate your speciality in construction:

a. Residentiol Houses
b. General Buildings
c. Highway
d. Heavy Construction
e. Other Please Specify: _____

II. Circal one of the following to indicate the nationality:

a. Saudi
b. Saudi - Saudi Join Venture
c. Saudi - Foreign Join-Venture
d. Non-Saudi

III. Circal one of the following to indicate years of experience:

a. Less than 1 year
b. 1 to 3 years
c. 3 to 5 years
d. 5 to 10 years
e. More er than 10 years

VI. Circal one of the following to indicate the annual construction volume of your firm in Saudi Riyals:

a. Over 500 million
b. 250 to 500 million
c. 100 to 250 million
d. 50 to 100 million
e. 10 to 50 million
f. Under 10 million

V. Circal one of the following to indicate the average number of workers in your firm:

a. Over 1000 workers
b. 500 to 1000 workers
c. 250 to 500 workers
d. 100 to 250 workers
e. 50 to 100 workers
f. Under 50 workers

IV. Circal one of the following to indicate the highest grade of your firm according to the Minstery of Housing and Public Works classification:

a. One
b. Two
c. Three
d. Four

IIV. Based on your experience in the construction, how influence each of the following causes in the business failure among contractors:

	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUENCE	CAN'T DECIDE
A. MANAGERIAL CAUSES:					
1-LACK OF EXPERIENCE IN THE LINE OF WORK.	[ ]	[ ]	[ ]	[ ]	[ ]
2-REPLACE KEY PERSONNEL.	[ ]	[ ]	[ ]	[ ]	[ ]
3-ASSINGING PROJECT LEADER IN THE SITE.	[ ]	[ ]	[ ]	[ ]	[ ]
4-BAD DECISIONS IN REGULATING COMPANY POLICY.	[ ]	[ ]	[ ]	[ ]	[ ]
5-LABOR PRODUCTIVITY AND IMPROVEMENT.	[ ]	[ ]	[ ]	[ ]	[ ]
6-USE OF PROJECT MANAGEMENT TECHNIQUES.	[ ]	[ ]	[ ]	[ ]	[ ]
7-COMPANY ORGANIZATION.	[ ]	[ ]	[ ]	[ ]	[ ]
8-PROCUREMENT PRACTICES.	[ ]	[ ]	[ ]	[ ]	[ ]
9-CLAIMS.	[ ]	[ ]	[ ]	[ ]	[ ]
10-INTERNAL COMPANY PROBLEMS.	[ ]	[ ]	[ ]	[ ]	[ ]
11-RECRUITING FROM ONE COUNTRY.	[ ]	[ ]	[ ]	[ ]	[ ]
12-RECRUITING MALTINATIONALITY.	[ ]	[ ]	[ ]	[ ]	[ ]
13-OWNER ABSENT FROM THE COMPANY.	[ ]	[ ]	[ ]	[ ]	[ ]
14-USING COMPUTER APPLICATIONS	[ ]	[ ]	[ ]	[ ]	[ ]
15-FRAUDS	[ ]	[ ]	[ ]	[ ]	[ ]
16-NEGLECT.	[ ]	[ ]	[ ]	[ ]	[ ]
B. ENVIRONMENTAL CAUSES:					
1-NATIONAL SLUMP IN ECONOMY.	[ ]	[ ]	[ ]	[ ]	[ ]
2-CONSTRUCTION INDUSTRY REGULATIONS IN SAUDIA.	[ ]	[ ]	[ ]	[ ]	[ ]
3-OWNER INVOLVEMENT IN CONSTRUCTION PHASE.	[ ]	[ ]	[ ]	[ ]	[ ]
4-BAD WEATHER.	[ ]	[ ]	[ ]	[ ]	[ ]

	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUENCE	CAN'T DECIDE
C FINANCIAL CAUSES:					
1-LOW MARGIN PROFIT DUE TO COMPETITION.	[ ]	[ ]	[ ]	[ ]	[ ]
2-CASH FOLW MANAGEMENT.	[ ]	[ ]	[ ]	[ ]	[ ]
3-POOR ESTIMATION PRACTICES.	[ ]	[ ]	[ ]	[ ]	[ ]
4-BILL AND COLLECTING EFFECTIVELY.	[ ]	[ ]	[ ]	[ ]	[ ]
5-CONTROLLING EQUIPMENT COST AND USAGE.	[ ]	[ ]	[ ]	[ ]	[ ]
6-EVALUATE PROJECT PROFIT IN ONE FISCAL YEAR.	[ ]	[ ]	[ ]	[ ]	[ ]
7-EMPLOYEE BENEFITS AND COMPENSATIONS.	[ ]	[ ]	[ ]	[ ]	[ ]
D. EXPANSION CAUSES:					
1-EXPANDING INTO NEW GEAGRAPHIC LOCATIONS.	[ ]	[ ]	[ ]	[ ]	[ ]
2-OPENING A REGIONAL OFFICE.	[ ]	[ ]	[ ]	[ ]	[ ]
3-INCREASED NUMBER OF PROJECTS.	[ ]	[ ]	[ ]	[ ]	[ ]
4-INCREASED SIZE OF PROJECTS	[ ]	[ ]	[ ]	[ ]	[ ]
5-CHANGE IN THE TYPE OF WORK	[ ]	[ ]	[ ]	[ ]	[ ]
6-LACK OF MANAGERIAL DEVELOPMENT OR MATURITY AS THE COMPANY GROWTH.	[ ]	[ ]	[ ]	[ ]	[ ]
7-CHANGE FROM PRIVATE TO PUBLIC OR VICE VERSA.	[ ]	[ ]	[ ]	[ ]	[ ]
E-OTHER CAUSES PLEASE SPECIFY:					
-_____	[ ]	[ ]	[ ]	[ ]	[ ]
-_____	[ ]	[ ]	[ ]	[ ]	[ ]
-_____	[ ]	[ ]	[ ]	[ ]	[ ]

COMMENTS:_____

_____

APPENDIX-II

FREQUENCIES

1. All Contractors Frequencies

2 Grade One and Two List Frequencies

3. Grade Three List Frequencies

4. Grade Four List Frequencies

ALL CONTRACTORS FREQUENCIES

A. MANAGERIAL CAUSES:

CAUSES OF FAILURE	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUENCE	CAN'T DECIDE
1-LACK OF EXPERIENCE IN THE LINE OF WORK.	53	14	0	1	0
2-REPLACE KEY PERSONNEL.	25	36	6	1	0
3-ASSINGING PROJECT LEADER IN THE SITE.	30	20	10	5	3
4-BAD DECISIONS IN REGULATING COMPANY POLICY.	39	23	2	2	2
5-LABOR PRODUCTIVITY AND IMPROVEMENT.	32	27	7	1	1
6-USE OF PROJECT MANAGEMENT TECHNIQUES.	19	34	8	4	3
7-COMPANY ORGANIZATION.	28	28	9	3	0
8-PROCUREMENT PRACTICES.	19	31	10	2	6
9-CLAIMS.	13	20	26	5	4
10-INTERNAL COMPANY PROBLEMS.	23	30	9	3	3
11-RECRUITING FROM ONE COUNTRY.	8	19	27	12	2
12-RECRUITING MALTINATIONALITY.	6	8	21	32	1
13-OWNER ABSENT FROM THE COMPANY.	34	19	10	3	2
14-USING COMPUTER APPLICATIONS	12	20	12	22	2
15-FRAUDS	29	21	11	5	2
16-NEGLECT.	46	19	1	1	1

ALL CONTRATORS FREQUENCIES

B. FINANCIAL CAUSES:

CAUSES OF FAILURE	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUE.	CAN'T DECIDE
1-LOW MARGIN PROFIT DUE TO COMPETITION.	25	28	14	1	0
2-CASH FOLW MANAGEMENT.	24	37	6	0	1
3-POOR ESTIMATION PRACTICES.	44	20	3	1	0
4-BILL AND COLLECTING EFFECTIVELY.	32	21	11	3	1
5-CONTROLLING EQUIPMENT COST AND USAGE.	20	35	8	5	0
6-EVALUATE PROJECT PROFIT IN ONE FISCAL YEAR.	9	29	18	11	1
7-EMPLOYEE BENEFITS AND COMPENSATIONS.	7	21	20	19	1

C. EXPANSION CAUSES:

1-EXPANDING INTO NEW GEAGRAPHIC LOCATIONS.	7	23	21	7	10
2-OPENING A REGIONAL OFFICE.	1	19	25	14	9
3-INCREASED NUMBER OF PROJECTS.	11	21	21	13	2
4-INCREASED SIZE OF PROJECTS	22	24	15	6	1
5-CHANGE IN THE TYPE OF WORK	12	36	14	4	2
6-LACK OF MANAGERIAL DEVELOPMENT OR MATURITY AS THE COMPANY GROWTH.	29	28	8	2	1
7-CHANGE FROM PRIVATE TO PUBLIC OR VICE VERSA.	2	10	25	27	4

D. ENVIRONMENTAL CAUSES:

1.NATIONAL SLUMP IN ECONOMY.	38	23	5	1	1
2.CONSTRUCTION INDUSTRY REGULATIONS IN SAUSIA.	15	15	19	11	8
3.OWNER INVOLVEMENT IN CONSTRUCTION PHASE.	17	22	13	10	6
4.BAD WEATHER.	4	18	29	14	3

GRADE ONE AND TWO LIST FREQUENCIES

A. MANAGERIAL CAUSES:

CAUSES OF FAILURE	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUENCE	CAN'T DECIDE
1-LACK OF EXPERIENCE IN THE LINE OF WORK.	17	2	0	0	0
2-REPLACE KEY PERSONNEL.	8	10	1	0	0
3-ASSINGING PROJECT LEADER IN THE SITE.	6	6	4	1	2
4-BAD DECISIONS IN REGULATING COMPANY POLICY.	10	9	0	0	0
5-LABOR PRODUCTIVITY AND IMPROVEMENT.	6	11	2	0	0
6-USE OF PROJECT MANAGEMENT TECHNIQUES.	8	8	2	1	0
7-COMPANY ORGANIZATION.	8	9	2	0	0
8-PROCUREMENT PRACTICES.	5	9	4	0	1
9-CLAIMS.	3	5	8	2	1
10-INTERNAL COMPANY PROBLEMS.	7	7	2	2	1
11-RECRUITING FROM ONE COUNTRY.	3	4	8	4	0
12-RECRUITING MALTINATIONALITY	2	2	7	8	0
13-OWNER ABSENT FROM THE COMPANY.	8	8	2	1	0
14-USING COMPUTER APPLICATIONS	3	8	4	4	0
15-FRAUDS	7	4	4	3	1
16-NEGLECT.	10	7	1	1	0

GRADE ONE AND TWO LIST FREQUENCIES

B. FINANCIAL CAUSES:

CAUSES OF FAILURE	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUE.	CAN'T DECIDE
1-LOW MARGIN PROFIT DUE TO COMPETITION.	8	7	3	1	0
2-CASH FOLW MANAGEMENT.	7	11	1	0	0
3-POOR ESTIMATION PRACTICES.	10	8	1	0	0
4-BILL AND COLLECTING EFFECTIVELY.	9	5	3	1	1
5-CONTROLLING EQUIPMENT COST AND USAGE.	2	13	3	1	0
6-EVALUATE PROJECT PROFIT IN ONE FISCAL YEAR.	1	7	7	4	0
7-EMPLOYEE BENEFITS AND COMPENSATIONS.	1	4	8	6	0

C. EXPANSION CAUSES:

1-EXPANDING INTO NEW GEAGRAPHIC LOCATIONS.	1	7	4	2	5
2-OPENING A REGIONAL OFFICE.	0	6	4	4	5
3-INCREASED NUMBER OF PROJECTS.	3	3	7	5	1
4-INCREASED SIZE OF PROJECTS	3	8	4	3	1
5-CHANGE IN THE TYPE OF WORK	2	12	0	3	2
6-LACK OF MANAGERIAL DEVELOPMENT OR MATURITY AS THE COMPANY GROWTH.	6	7	5	0	1
7-CHANGE FROM PRIVATE TO PUBLIC OR VICE VERSA.	1	3	6	7	2

D. ENVIRONMENTAL CAUSES:

1.NATIONAL SLUMP IN ECONOMY.	9	7	2	0	1
2.CONSTRUCTION INDUSTRY REGULATIONS IN SAUSIA.	5	2	6	2	4
3.OWNER INVOLVEMENT IN CONSTRUCTION PHASE.	1	8	4	2	4
4.BAD WEATHER.	0	3	6	8	2

GRADE THREE LIST FREQUENCIES

A. MANAGERIAL CAUSES:

CAUSES OF FAILURE	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUENCE	CAN'T DECIDE
1-LACK OF EXPERIENCE IN THE LINE OF WORK.	21	6	0	0	0
2-REPLACE KEY PERSONNEL.	8	15	4	0	0
3-ASSINGING PROJECT LEADER IN THE SITE.	12	8	5	2	0
4-BAD DECISIONS IN REGULATING COMPANY POLICY.	19	4	2	1	1
5-LABOR PRODUCTIVITY AND IMPROVEMENT.	17	7	2	1	0
6-USE OF PROJECT MANAGEMENT TECHNIQUES.	7	14	2	3	1
7-COMPANY ORGANIZATION.	11	10	4	2	0
8-PROCUREMENT PRACTICES.	7	12	4	1	3
9-CLAIMS.	5	9	8	3	2
10-INTERNAL COMPANY PROBLEMS.	9	12	4	1	1
11-RECRUITING FROM ONE COUNTRY.	3	10	8	5	1
12-RECRUITING MALTINATIONALITY.	1	2	11	12	1
13-OWNER ABSENT FROM THE COMPANY.	12	9	5	1	0
14-USING COMPUTER APPLICATIONS	6	9	2	9	1
15-FRAUDS	11	10	4	1	1
16-NEGLECT.	20	6	0	0	1

GRADE THREE LIST FEQUENCIES

B. FINANCIAL CAUSES:

CAUSES OF FAILURE	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUE.	CAN'T DECIDE
1-LOW MARGIN PROFIT DUE TO COMPETITION.	9	12	6	0	0
2-CASH FOLW MANAGEMENT.	10	15	2	0	0
3-POOR ESTIMATION PRACTICES.	19	6	1	1	0
4-BILL AND COLLECTING EFFECTIVELY.	13	9	4	1	0
5-CONTROLLING EQUIPMENT COST AND USAGE.	10	12	4	1	0
6-EVALUATE PROJECT PROFIT IN ONE FISCAL YEAR.	3	11	7	5	1
7-EMPLOYEE BENEFITS AND COMPENSATIONS.	4	9	7	6	1

C. EXPANSION CAUSES:

1-EXPANDING INTO NEW GEAGRAPHIC LOCATIONS.	2	10	10	3	2
2-OPENING A REGIONAL OFFICE.	1	6	12	6	2
3-INCREASED NUMBER OF PROJECTS.	5	10	9	3	0
4-INCREASED SIZE OF PROJECTS	9	10	6	2	0
5-CHANGE IN THE TYPE OF WORK	6	13	8	0	0
6-LACK OF MANAGERIAL DEVELOPMENT OR MATURITY AS THE COMPANY GROWTH.	12	14	0	1	0
7-CHANGE FROM PRIVATE TO PUBLIC OR VICE VERSA.	1	5	10	10	1

D. ENVIRONMENTAL CAUSES:

1.NATIONAL SLUMP IN ECONOMY.	17	8	1	1	0
2.CONSTRUCTION INDUSTRY REGULATIONS IN SAUSIA.	4	7	9	5	2
3.OWNER INVOLVEMENT IN CONSTRUCTION PHASE.	8	7	7	5	0
4.BAD WEATHER.	2	8	13	3	1

GRADE FOUR LIST FREQUENCIES

A. MANAGERIAL CAUSES:

CAUSES OF FAILURE	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUENCE	CAN'T DECIDE
1-LACK OF EXPERIENCE IN THE LINE OF WORK.	15	6	0	1	0
2-REPLACE KEY PERSONNEL.	9	11	1	1	0
3-ASSINGING PROJECT LEADER IN THE SITE.	12	6	1	2	1
4-BAD DECISIONS IN REGULATING COMPANY POLICY.	10	10	0	1	1
5-LABOR PRODUCTIVITY AND IMPROVEMENT.	9	9	3	0	1
6-USE OF PROJECT MANAGEMENT TECHNIQUES.	4	12	4	0	2
7-COMPANY ORGANIZATION.	9	9	3	1	0
8-PROCUREMENT PRACTICES.	7	10	2	1	2
9-CLAIMS.	5	6	10	0	1
10-INTERNAL COMPANY PROBLEMS.	7	11	3	0	1
11-RECRUITING FROM ONE COUNTRY.	7	5	11	3	1
12-RECRUITING MALTINATIONALITY.	3	4	3	12	0
13-OWNER ABSENT FROM THE COMPANY.	14	2	3	1	2
14-USING COMPUTER APPLICATIONS	3	3	6	9	1
15-FRAUDS	11	7	3	1	0
16-NEGLECT.	16	6	0	0	0

GRADE FOUR LIST FEQUENCIES

B. FINANCIAL CAUSES:

CAUSES OF FAILURE	VERY INFLUENCE	INFLUENCE	SLIGHTLY INFLUENCE	NOT INFLUE.	CAN'T DECIDE
1-LOW MARGIN PROFIT DUE TO COMPETITION.	8	9	5	0	0
2-CASH FOLW MANAGEMENT.	7	11	3	0	1
3-POOR ESTIMATION PRACTICES.	15	6	1	0	0
4-BILL AND COLLECTING EFFECTIVELY.	10	7	4	1	0
5-CONTROLLING EQUIPMENT COST AND USAGE.	8	10	1	3	0
6-EVALUATE PROJECT PROFIT IN ONE FISCAL YEAR.	5	11	4	2	0
7-EMPLOYEE BENEFITS AND COMPENSATIONS.	2	8	5	7	0

C. EXPANSION CAUSES:

1-EXPANDING INTO NEW GEAGRAPHIC LOCATIONS.	4	6	7	2	3
2-OPENING A REGIONAL OFFICE.	0	7	9	4	2
3-INCREASED NUMBER OF PROJECTS.	3	8	5	5	1
4-INCREASED SIZE OF PROJECTS	10	6	5	1	0
5-CHANGE IN THE TYPE OF WORK	4	11	6	1	0
6-LACK OF MANAGERIAL DEVELOPMENT OR MATURITY AS THE COMPANY GROWTH.	11	7	3	1	0
7-CHANGE FROM PRIVATE TO PUBLIC OR VICE VERSA.	0	2	9	10	1

D. ENVIRONMENTAL CAUSES:

1.NATIONAL SLUMP IN ECONOMY.	12	8	2	0	0
2.CONSTRUCTION INDUSTRY REGULATIONS IN SAUSIA.	6	6	4	4	2
3.OWNER INVOLVEMENT IN CONSTRUCTION PHASE.	8	7	2	3	2
4.BAD WEATHER.	2	7	10	3	0

VITA

Adil Abdulaziz Al-Barrak was born in Al-Hasa, Saudi Arabia, on May 13, 1963. Upon graduating from Secondary School, He enrolled at King Fahd University of Petroleum and Minerals (KFUPM). In June 1987, he graduated with a B.S. in Civil Engineering. Subsequently, he joined Saudi Aramco as a construction engineer. In February 1989, he enrolled at KFUPM to pursue a M.S. degree in the Construction Engineering and Management Program as a part-time student.