

The impact of risk management on construction projects success from the employees perspective

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Abstract

The main objective of this research was to study the impact of risk management on construction projects success. The survey which was directed to the participants was developed according the research design, approach, and data. This survey includes two major sections. The first section asked about the procedure followed in the organization to manage the risk. In section two, the survey attempts to specify if the project they experienced achieved the success criteria, this was according 7 criteria factors were defined for construction project success listed in the questionnaire. The distributed questionnaires were 230 questionnaires and got 200 questioners back with percentage of 87.4%. The results of the current study indicate that there is an impact exists between both Risk identification and Risk assessment on project success, scheduled time, planned budget, and the ability to comply with technical specifications. While there is no impact between Risk assessment and avoiding lawsuits or claims. Also the study indicate that there is an impact of Risk response on project success, meeting the scope of work, scheduled time, and achieving the quality standards.

Keywords: Impact ; Risk management ; Construction projects ; Success; Employees perspective

Introduction

The Hashemite Kingdom of Jordan is attractive country for investment, such as construction projects; that because of its strategic location, political stability and cultural particularities. All of this is essential for a successful experience. Because of the above mentioned reasons, the construction projects are rapidly increasing in Jordan as well as other investments. In addition, the construction industry has changed rapidly over the past

10 years; companies are faced with more risk and uncertainty than ever before. Clients expect more, most importantly, they do not want surprises, and are more likely to engage in litigation when things go wrong, these things make the project managers in Jordan and worldwide to think more about the relationship between these new risks and uncertainties and the success of the project they are managing and forced them to ask “Does risk management contribute to project success?”.

Risk management has become an important part of the management process for any project. In fact, Risk management came into the foreground of business literature during the last two decades of the 20th century (Loosemore et al., 2006). Actually, Akintoye et al. (2003) believes that the circumstances within the construction industry had led to adopting risk management and analysis into practice. Risk is one of key factors that can positively affect working effectively inside the firm if it was practiced in the proper way. By doing such organization can achieve capital value of rareness and capital value of limitability via which the firm can build stronger competitive advantage by developing maintaining and retaining core competencies; which can in its turn maximize the organization’s market share, reputation maximize share holder equity and stake holder goals and maintaining the maturity stage of the firm’s life cycle in which it can maintain the peak stage for all of its activities by recognizing, encouraging and retaining the peak performance.

An effective use of project management techniques such as risk and value management are considered as key supporting processes and to add to them quality, cost, time and change control (Fewings, 2005); all together generate an integrated approach to the project success. While, project risk management is a scalable activity and should be commensurate with the size and complexity of the project under consideration. Yet, simpler projects means utilizing simple qualitative analysis such as Project Management Online Guide in the Risk Management Plan spreadsheet, in similar vein, Larger more complex projects may wish to use more robust analysis techniques via Monte-Carlo simulation models. Risk management requires top-level management support, acknowledgment that risks are realities, and a commitment to identify and manage them. One discriminator of a successful organization or project is the use of risk management to anticipate potential negative conditions, problems, and realities. Ineffective projects are forced to react to problems; effective projects anticipate those (Loosemore et al., 2006).

The main challenges facing management are to estimate the level risk by the position holder, also to estimate whether the management is aware of the risk and are they implying their knowledge in the avoiding risks. Top management should investigate various types of

risks facing it is business , and how to manage the risk via education or past experience and other sources, also we can know how risk can affect the success degree of projects. Accordingly, this research sets sights on introducing the impact of risk management on construction projects success from the owners' and employees' perspectives.

Research objectives

The main objective of this research is to study the impact of risk management on construction projects success. The study also aims at:

- Studying and identifying the nature of relationship between implementing effective risk management and construction projects success.
- Identifying key risk factors that could stand in front of construction processes by reviewing the literature.
- Assessing the severity and the allocation of each identified risk factor
- Investigating management awareness of risk management, and applying their knowledge while managing these projects.
- Identifying the success criteria that were achieved in construction projects.

Research importance

This research importance stems from the essence of risk management itself, for the reason that risk management has been identified as one of the most important tools in determining any project success; yet, few studies investigate the nature of this relationship (Fewings, 2005). As a result, this research will drive the attention to the importance of a high level of awareness to risk management problems. In addition, studying the relation between risk management and project's success is important because most of projects are operating in a very dynamic and rapidly changing environment not always fixed circumstances and uncertainty factors are surrounding the firm, in such environment adopting changes very quickly is a must for the project overall to grow or even survive. Adopting overall project changes can't be applicable without the management ability to adapt model in risk management and make the new changes. Accordingly, the results of this research may help the managers to better evaluate the risks around them and better respond to these risks, and present them methods that may enhances their projects risk management.

Research Design and Approach

This study examines the impact of risk management on construction project success. A Likert scale survey was used to measure the dependent variable of project success and the

independent variable of Risk Management. The participants were employees in Consulting and Contracting companies who experienced previous project.

Response choices on the questionnaire were coded as 1 (Highly Agree), 2 (Agree), 3 (Neutral), 4 (Disagree) and 5. (Highly Disagree).

Sampling techniques

The survey which was directed to the participants was developed according the research design, approach, and data. This survey includes two major sections. The first section asked about the procedure followed in the organization to manage the risk, and investigation on if their organization practices effective risk management. In section two, the survey attempts to specify if the project they experienced achieved the success criteria, this was according 7 criteria factors were defined for construction project success listed in the questionnaire. These questions were analyzed to determine impact of risk management on construction project success. The survey was directed to employees who in companies that worked on Construction Projects in Amman. These companies were consultant Companies and contracting Companies.

Research Population

The scope of this research includes construction projects in Jordan. It was necessary to sample this research because it is impossible to conduct all the construction companies, the population consists of 4 leader consulting and contracting companies in Amman including 21 construction projects in Jordan. These companies are Sigma Consulting Engineers, Concorde Construction Company, Consolidated Contractors and Jo- Sadeen Contracting Company.

Research sample

The sample consists of employees who are related to risk management, in order to make sure about the quality of collected data. The sample consists of two hundred and thirty questionnaires, which were handled to various employees with deferent level of education, positions and experiences. To assure the maximum level of research sample engagement, the questionnaire was translated from English to Arabic which can help employees with various levels and backgrounds to better understand the phrases within the questionnaire that can lead to maximize their participation.

The distributed questionnaires were 230 questionnaires and got 200 questioners back with percentage of 87.4%.

Data Collection Method

The data for this research are collected via primary and secondary sources. The primary data was developed by questionnaire which was directed to the employees in the construction companies in order to collect data for statistical analysis of the research in order to test the hypothesis. Secondary Sources can be gained from book, specialized International Journals, Publications and the World Wide Web; also the researcher can make use of what was written in the literature in similar fields.

Research Hypothesis:

The following hypotheses were tested:

H_{a1}: There is an impact exists between Risk identification and project success.

H_{a1-1}: There is an impact exists between Risk Identification and the scheduled time.

H_{a1-2}: There is an impact exists between Risk Identification and the planned budget.

H_{a1-3}: There is an impact exists between Risk Identification and the ability to comply with technical Specifications.

H_{a2}: There is an impact exists between Risk Assessment and project success.

H_{a2-1}: There is an impact exists between Risk Assessment and planned budget.

H_{a2-2}: There is an impact exists between Risk Assessment and avoiding lawsuits or claims.

H_{a2-3}: There is an impact exists between Risk Assessment and the ability to keep future work with other entities involved with this project was important

H_{a3}: There is an impact exists between Risk Response and project success.

H_{a3-1}: There is an impact exists between Risk Response and achieving the quality standards which was originally specified in the specifications

H_{a3-2}: There is an impact exists between Risk Response and meeting the scope of work.

H_{a3-3}: There is an impact exists between Risk Response and the scheduled time

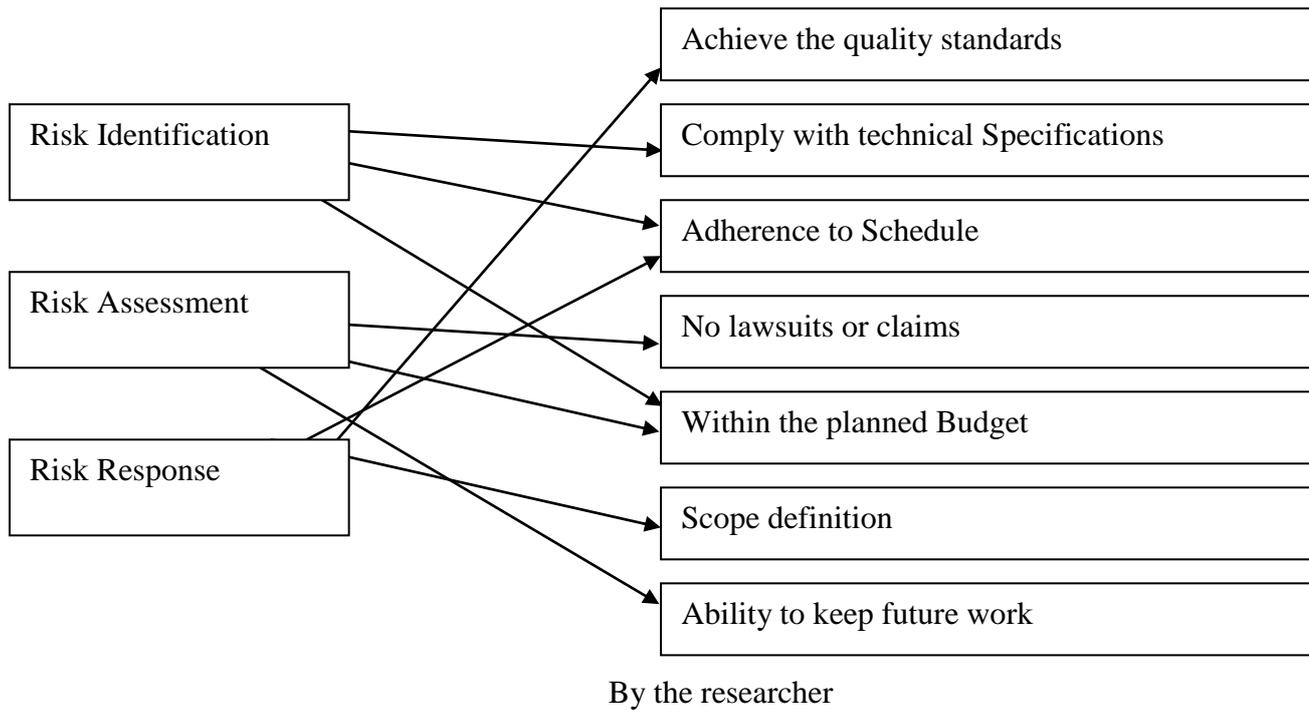
Theoretical model and variables

Three independent variable and seven dependent variable are in this research, the independent variables are: Risk Identification, Risk Assessment and Risk Response for the Construction Companies, the dependant variable are: Achieve the quality standards, Comply with technical Specifications, Adherence to Schedule, No lawsuits or claims, Within the planned Budget, Scope definition and Ability to keep future work

Theoretical Research Model

The model of this research consists of two types of variables, the independent variable and dependent as shown at the following figure:

Fig. 1: Theoretical Research Model



Literature Review

Mudau; Pretorius (2009) aim in their study “Project control and risk management for project success: A South African case study” to assess the extent to which project control and risk management contribute to, and how it can be used effectively in ensuring project success and identify the factors that contribute to project success. The results of the questionnaire were processed and analyzed by using a spreadsheet application. The main findings indicated that project controlling and risk management have a significant influence on performance of the project and therefore on the success of the company. It was also found that effective earned value management contributes positively to the project success. By strengthening and focusing more on project controlling and risk management methods and processes, the performance of projects should improve.

Ewer (2008) explain in their study “The Impact of Risk Management on IS Projects Success in Syria” the impact of the risk management, on information systems projects in Syria. It uses questionnaire to get information from IS managers and developers in Syria. The conclusion of this research presents that many of Syrian IS companies don't have a formal risk method, and using risk management will increase the success rate of IS project.

Bakker and Wortmann (2010) present in their paper “Does risk management contribute to IT project success? A meta-analysis of empirical evidence” a meta-analysis of the empirical evidence that either supports or opposes the claim that risk management

contributes to IT project success. In addition, this paper also investigates the validity of the assumptions on which risk management is based. The analysis leads to remarkable conclusions. Over the last 10 years, much has become known about what causes IT projects to fail. However, there is still very little empirical evidence that this knowledge is actually used in projects for managing risks in IT projects. This paper concludes with indicating new directions for research in the relation between risk management and project success. Key elements are stakeholder perception of risk and success and stakeholder behavior in the risk management process.

Because the delay in construction projects in developing countries which cause financial losses, Luu et al. (2009) described the Bayesian Belief Network (BBN) in their paper "Quantifying schedule risk in construction projects using Bayesian belief networks" and it was applied to quantify the delays in construction projects probabilities in developing countries. The research identified sixteen factors that cause the delay in such projects, those sixteen factors were identified through a questionnaire survey of 166 professionals. The study found that more than half of the first respondents and functional and top managers (48%) and 10% from functional managers. From this percentage, we can make sure that the collected data is real and can be used to identify factors affecting construction delay.

Zou et al. (2007) in their paper "Understanding the key risks in construction projects in China" aim to investigate the key risk in construction projects in China in order to develop strategies to manage them. The researcher classifies the risk according to their significance of the influences of typical project objective in terms time, quality, safety and environmental sustainability, and then to investigate from the stakeholders perspective. The researcher achieved his goal and collected data by questionnaire survey, total 25 key risks were ascertained. And then the researchers compared these risks which found with the same survey in construction projects in Australian to find the unique risks in construction projects in China. The researcher conclude that the responsibility must be held by the clients, designers and government in order to manage their risk and to address potential risk on time, the risk must be minimized in construction projects ad carried out safe, efficient and quality by the contractors and subcontractors with robust construction and management knowledge.

In this study Karimi, Azari et al. (2011) obtain Decision criteria from the nominal group technique (NGT). The proposed method can discriminate successfully and clearly among risk assessment methods. This Study concludes that the identification and assessment of project risk are the critical procedures for projecting success, and this study conclude that

there must be in Construction project between dissimilar, yet contractually integrated parties, owners, designers, contractors, sub-contractors, suppliers, manufacturers, and others.

Bates (2009) analyzed and predicted in his research “The owners’ role in project success” project success through providing an efficient method for project success. The objective of the research is to investigate the effect of owner’s decisions and actions that occur during a construction project. The research investigated two models; One is classical statistical technique—multiple regression, the other is a modern artificial intelligence technique—neural networks. Both traditional regression analysis and artificial neural networks were beneficial for success analysis. This study shows that the combination of use statistical and artificial neural network yield the best results, while each is appropriate for distinct types of problems because each has unique advantages and disadvantages. The study concludes that the most owners have to focus during the execution of a capital facility project on the following three statements:

- 1 – Practice the most appropriate level of "owner involvement" during the project.
- 2 – Focusing on safety must be practiced by owners at every aspect of the project.
- 3 - Define goals and objectives, a sense of urgency, and emphasize safety.

Culler (2009) defined in his dissertation “The degree of relationship between critical success factors and information technology project performance” study was to define the relationships between the 10 critical success factors and information technology project performance. The current research data supported associations between 10 critical success factors and information technology project performance. The current research data confirmed that there is relationship between 10 critical success factors and information technology project performance. This research examined deeper the affect of project demographics on relationships between 10 critical success factors and information technology project performance. This research found that the examination of the data analysis failed to support a significant affect by project demographics on the relationships between 10 critical success factors and performance of information technology project.

Theoretical Framework

Construction Industry Definition: The construction projects can be defined as the industry that creates infrastructure for cities, towns and industries, and considered to be one of the largest industries in the world. This industry is made out of many types of buildings in addition to civil Engineering jobs. This industry contains carpentry, construction of roads, developing bridges and designing homes.

Types of construction projects

There are different types of construction projects according to Grace F. M. (2010):

1- Residential: This type of construction projects includes different types of buildings such as houses, townhouses, apartments, and subdivisions. The process to design the houses is done, in general, by the architects and engineers and the builders (or may hire subcontractors) do structural, electrical, mechanical and other specialty work in the construction process of these houses. Local building authority regulations and codes must be applied in these buildings. The market of this type of building is highly competitive and high risks as well as high rewards.

2- Building: The most popular type of construction project is the Building construction. It can be defined as “is the process of adding structure to real property” (Grace F. M., 2010). The building projects in the most cases are adding a new room and making small renovations. Most new building construction projects are building sheltered enclosures in order to house people, equipment or machinery. Installation of utilities and equipment is included.

3- Institutional and Commercial: A great variety of institutional and commercial building are available in this industry with different types and sizes such as schools, universities, hospitals, clinics, sports facilities, stadiums, large shopping centers and retail chain stores, light manufacturing plants and warehouses and skyscrapers for offices and hotels. The designs of such building must be done by specialty architects and engineers who are often hired for designing such buildings. Few competitors are competing in this market of these types of buildings because of the high capital needed in addition this type is sophisticated compared to residential construction projects.

4- Industrial: This type represents small percentage of the whole industrial construction. while it is a very important part of the industry. The owners of such projects are generally big, profit, industrial corporations and institutions such as manufacturing, power generation, medicine, petroleum, etc. highly specialized expertise processes in planning, cost estimating, design, and construction are required for these industries.

5- Specialized Industrial Construction: Very large scale projects represent this type of construction project and involve high degree of technological complexity such as nuclear power plants, chemical processing plants, steel mills and oil refineries.

6- Highway Construction: Highway construction “involves the construction, alteration, or repair of roads, highways, streets, alleys, runways, paths, parking areas, etc” (Grace F. M., 2010).

7- Heavy Construction: All the projects that are not properly classified as either "building" or "highway" are the heavy construction projects. Such as water and sewer line projects, dams, dredging projects flood, control projects, sewage treatment plants and facilities, and water treatment plants and facilities.

Construction processes

1- Design Team: The main purpose of the design team is to assemble and to plan the procedures, and to integrate those procedures with the other parts. The designers prepare the drawings and specifications, which represent the contents of the design. A design team including surveyors, civil engineers, cost engineers (or quantity surveyors), mechanical engineers, electrical engineers, structural engineers and fire protection engineers, and it depends on the construction size.

2- Financial advisors. The Financial advisors can be defined as is one or group of professional/s, who can advise the investment of the project. The investment advice involves planning process which is created by mortgage bankers, accountants, and cost engineers and the financial advisors.

3- Legal considerations: It can be defined as is a set of laws that deals all the issues construction buildings and deals with all of their components. In each country, there are zoning and building code requirements, these zoning and building code are defined by the government in this country. So, the construction project must follow these zoning and building codes.

4- Interaction of different parties: The design that is prepared by the designers must take into consideration that the design is applicable; it means that it must be appropriate for the use and location, and meets the legal consideration of the country that is built in and it must be financially possible to build in order to be economic visible for the owners.

5- Procurement: Different types of procurement in the construction projects, these types according to Constructing Excellence, 2004 are Traditional or Design-Bid-Build, Two stage tender , and Design-Build

Risk Management

Definition of risk and risk management: The royal society (1991) had defined the risk as "The probability that a particular adverse event occurs during a stated period of time". Akintoye et al (2003) emphasized this definition because the probability of happening harmful impact and the duration of exposure were included in his study.

The source of risk can't be specified; sometimes, its source is employees' and managers' limited knowledge, limited experience and information cause to arise the risk. The source

of the risk may be changes in the parties included in construction process. Sometimes the risk come from financial markets, project failures, legal liabilities, credit risk, accidents, natural causes and disasters and from competitors.

Sources of risks: A lot of studies worldwide aim to define the sources of studies. Research Week International Conference, 2005 categorized the sources of risks into two groups: (1) Internal Source and External sources. The Internal (controllable) sources are Client system, Consultants, Contractors and subcontractors and Suppliers. While the external Sources are Economic and globalization dynamics, Unforeseen circumstances, Government/ statutory/ political controls, Environmental constraints, Health and safety issues outside the control of the project team and Socio-cultural issues

Risk assessment

The risk management aims to identify the undesired event to estimate risk, and it aims to like hood the unfavorable event to occur. The risk assessment helps in risk management by measuring, conducting quantitatively and qualitatively in order to estimate the significance level of the industrial risk factors to the project and then to estimate of the risk of the potential factors to project success. The result of this step determines the input to make the optimum decision.

After the risks have been identified, it can be evaluated regarding its impact on the projects and the probability of its occurrence. This step is very critical to evaluate and expect the probability of occurrence of the risk and the impact of this risk and its effect on the different components of construction projects.

Table 2.2: Various risk assessment techniques.

Qualitative	Quantitative
a. Direct judgment	e. Probability analysis
b. Ranking options	f. Sensitivity analysis
c. Comparing options	g. Scenario analysis
d. Descriptive analysis	h. Simulation analysis

(Ward and Chapman, 1997)

Qualitative Risk Analysis

In qualitative risk analysis, risk management acts to define the characteristics of each risk (Kuismanen et al, 2002). The qualitative assessment involves the identification of: (1) Risks’ hierarchy which is based on the probability of risk’s occurrence and its impact on the project and employees, (2) Risks’ scope, and (3) Risk occurrence factors (Lowe, 2002). Qualitative risk analysis assesses the risk according to its probability of occurrence and its

impact in order to enable the decision makers to prioritize the risks which have a high probability of occurrence and big impact on the project and response to them accordingly.

Steps of risk analysis are (Kindinger & Darby, 2000):

- List activities, tasks, or elements that make up the project.
- Identify applicable risk factors.
- Develop risk-ranking scale for each risk factor.
- Rank risk for each activity for each risk activity.
- Document the results and identify potential risk-reduction actions.

Quantitative Risk Analysis

In quantitative risk analysis, the risk is assessed numerically by estimating the probability that a project will success in meeting the planned budget and time schedule. Quantitative Risk Analysis process involves evaluation of the impact of all identified and quantified risks. The results of quantitative Risk Analysis process are more objective than those from qualitative risk analysis if enough data are available for the decision maker. In addition the personal judgment and previous experience are factors that affect this process. (Ahmed et al, 2001).

Quantitative risk analysis suggested statistical techniques that are most easily used with specialized software (Office of Project Management Process Improvement, 2003). According to (Abu Rizk, 2002), the quantitative risk analysis contains assigning probabilities or likelihood to different factors of risks and the impact of these factors in order to define the severity for each factor (Abu Rizk, 2002).

Risk Attitudes

Risk attitude is defined as “chosen state of mind with regard to those uncertainties that could have a positive or negative effect on objective”. (hillsor and Murray – Webster, 2007). So the employees risk attitudes is affected by different characteristics such as; personal and experience characteristics, economic, environment of management that they belong to and the policy that around them. In addition, the individual’s positive and negative evaluation of characteristics of different types of behaviors represents the base of the attitude (Te o and Loose more, 2001).

Research findings

The study aims at identifying the opinions of the study sample about “The impact of risk management on construction projects success”. And to achieve this end we have developed a questionnaire to review the opinions of the study sample. After questionnaires were distribution Answers were recoded into SPSS program, then we have adopted an

appropriate statistical analysis it test the study hypotheses. Cronbach's Alpha used to Reliability test it reaches 96.5% for all statements which is very good due to that it is more than excepted value 60%.

Statistical Analysis:

The characteristics of study subjects were described using frequency and means, distribution. Categorical variables were described by frequencies and percentages.

The Demographical Properties:

1) Gender

Table 5.1: Gender

<i>Gender</i>	Frequency	Percent
Male	143	71.5
Female	57	28.5
Total	200	% 100

The table shows disruption of the sample according to Gender.

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The table shows that males were more than females. They were (143) with a (%71.5). Females were (57) with a (%28.5).

2) Age:

Table 5.2: Age

		Age			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than-30 years	102	50.5	50.5	50.5
	30-39 years	67	33.5	33.5	84.0
	. 40-49 years	21	10.5	10.5	94.5
	50-59	11	5.5	5.5	100.0
	Total	201	100.0	100.0	

The table shows disruption of the sample according to Age.

The above table shows that:

- 50.5% of the sample less than 30 years old.
- 33.5% of the sample 30-39 years old.
- 10.5% of the sample 40-49 years old.
- 5.5% of the sample 50-59 years old.

2) Level of education

Table 5.3: Education

		education			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Master	14	7.0	7.0	7.0
	High Diploma	5	2.5	2.5	9.5
	Bachelors	142	71.0	71.0	80.5
	Diploma	39	19.5	19.5	100.0
	Total	200	100.0	100.0	

The table shows disruption of the sample according to Level of education.

The above table shows that:

- 7% of the sample has Master.
- 2.5% of the sample has High Diploma.
- 71% of the sample has Bachelors.
- 19.5% of the sample has Diploma.

Table 5.4: Job Title

<i>Job Title</i>	Frequency	Percent
manager	12	6
Head of department	25	12.5
Head of section	6	3
Administrative clerk	48	24
Other	110	54.5
Total	200	100

Table (4) shows disruption of the sample according to Job Title.

The above table shows that:

- 6% of the samples are managers.
- 12.5% of the samples are Head of department.
- 3% of the samples are Head of section.
- 24% of the samples are Administrative clerk.
- 54.5% of the samples have other Job title.

Table 5.5: Experience

<i>Experience</i>	Frequency	Percent
5-9	11	5.5
10-14	41	20.5
15-19	85	42.5
20-24	63	31.5
Total	200	100.0

Table (5) shows disruption of the sample according to experience. The table shows that (%5.5) of the samples were 5-less than 10 years of experience at the current position, (%20.5) have 10-less than 15 years, (%42.5) have 15-less than 20 years of experience at the current position, (%31.5) have 20-less than 25 years of experience at the current position.

6) Total experience including the current position

Table (6): Total experience including the current position

<i>experience</i>	Frequency	Percent
less than 5	5	2.5
5-9	10	5
10-14	48	24
15-19	79	39.5
20-24	58	29
Total	200	100.0

Table (6) shows disruption of the sample according to experience including the current position. The table shows that (%27.3) of the samples were less than 5 years of experience including the current position, (%26.4) have 9-5years, (%30.7) have 10-14 years of experience including the current position.

Descriptive Statistics

Mean & St. Deviation were calculated & Arranged by the most important statement to the less, Depending on means

Aims to investigate the Risk Management

Risk Identification

Table 5.7: Mean & St. Deviation of Risk Identification Arranged by the most important statement to the less, Depending on means

Statements Risk Identification	mean	St. Deviation	Importance
	Your organization has identified and applied procedures for the systematic identification of opportunities	4.23	0.854841
The management tends to identify the losses of risk	4.16	0.864951	High
The management tends to identify how and why risks arise?	4.154364	0.874648	High
The management used the experience of the organization to identify the risk.	4.147963	0.881597	High
The management used analyzing process to identify the risk.	4.134464	0.854741	High
The management used scenario analysis to identify the risk.	4.1	0.808249	High
The management tends to identify the area of risk's impact	3.918036	0.924213	High
The management used physical inspection to identify the risk.	3.9	1.012485	High
The management tends to identify the risk's source	3.898036	0.922211	High
The management used questionnaires to identify the risk.	3.8375	0.882817	High
The management used interview to identify the risk.	3.767273	0.862663	High
The management used brainstorming to identify the risk	3.52625	1.085436	High
The management used SWOT Analysis to identify the risk	3.484444	1.077533	Medium
The management used examination of local/overseas experience to identify the risk	3.43963	1.197862	Medium
Total	3.906997	0.936018	High

The above table indicates that there is a high rate of Risk Identification mean was (3.906) which is less than the agree line (3.50).

Risk Assessment

Table:8.5: Mean & St. Deviation of Risk Assessment Arranged by the most important statement to the less, Depending on means

Question	mean	St. Deviation	Importance
	analyses and evaluates opportunities it has to achieve objectives	4.448182	0.691473
Your organization tries to identify the strengths and weaknesses of the risk management systems of other organizations it works with	4.252778	0.829757	High
Your Organization collates risks in order to develop decision making on appropriate actions`	4.172963	0.820708	High
The risk is analyzed according to likelihood	4.164821	0.725424	High
The risk is analyzed according to consequence	4.081	0.791574	High
Your organization assess the risk by quantitative analysis methods	4.048214	0.80063	High
The risk is analyzed according to reputation impact	3.947909	1.019391	High
The risk is analyzed according to achievement of objectives	3.925	1.051142	High
The risk is analyzed according to financial impact	3.898529	0.9822	High
Your organization assess the risk by qualitative analysis methods	3.87	0.963192	High
Total	4.08094	0.867549	High

The above table indicates that there is a high rate of Risk Assessment mean was (4.08) which is more than the agree line (3.50).

Risk Response

Table 5.9: Mean & St. Deviation of Risk Response Arranged by the most important statement to the less, Depending on means

Statement	mean	St. Deviation	Importance
Your organization identified risk management plan	4.21	0.780349	High
Your organization takes into consideration the limits to achieve risk management objective.	4.148	0.693233	High
To evaluate the costs and benefits of identifying risks	4.075444	0.637543	High
Finding out the effectiveness of available controls and risk management responses	4.018039	0.792385	High
Your management prioritize of risks that cause a great losses	3.981852	0.764066	High
Your organization identified up to date business continuity plan	3.613	0.984036	High
Total	4.007723	0.775269	High

The above table indicates that there is a high rate of Risk Response mean was (4.00) which is more than the agree line (3.50).

To what extent does organization use the risk treatment option?

Table 5.10: Mean & St. Deviation Arranged by the most important statement to the less, depending on means

Statement	mean	St. Deviation	Importance
The responsible managers must understand the risks faced by the organization	4.362143	0.654243	High
Senior management are responsible regarding communications about risk	4.345	0.830314	High
Your Organization support the effective management of risk between staff and management	4.294018	0.753017	High
The organization provides appropriate level of control regarding risks that it faces	4.211321	0.965474	High
transferring the risk	4.13	0.869991	High
Reducing the risk?	4.106339	0.926312	High
Monitoring the effectiveness of risk management is an integral part of routine management reporting.	4.08	1.029026	High
Avoiding the risk?	3.965	0.931727	High
accepting/retaining the risk	3.568	1.143753	High
Total	4.11798	0.900429	High

The above table shows what extent does organization uses the risk treatment option:

- The First option was the responsible managers must understand the risks faced by the organization.
- Second option senior management are responsible regarding communications about risk.
- Third Your Organization support the effective management of risk between staff and management.

- Forth the organization provides appropriate level of control regarding risks that it faces.
- Fifth option transferring the risk.
- Sixth option monitoring the effectiveness of risk management is an integral part of routine management reporting.
- Seventh option avoiding the risk.
- Eighth option: accepting/retaining the risk.

Success Criteria

Table 5.11: Mean & St. Deviation of Success Criteria

Arranged by the most important to the less, Depending on means

Degree	Statement	mean	St. Deviation	Importance
1	Scope definition/management—well defined and maintained (no changes)	4.3	0.832747	High
2	Comply with technical Specifications	4.274911	0.786436	High
3	The project is within the planned Budget	4.208571	0.643489	High
4	Achieve the quality standards which was originally specified in the specifications	4.187679	0.736734	High
5	Adherence to Schedule— “Bring the project on or ahead of schedule.”	4.116339	0.757898	High
6	Future work with other entities involved with this project was important	4.04	0.735599	
7	No lawsuits or claims.	4.025	0.746432	High
	Total	4.164643	0.748476	High

The above table shows degree each of the critical success factors applied and achieved.

HYPOTHESIS

Ha1: There is an impact exists between Risk identification and project success.

To test this hypothesis, Regression was used to find out if there is impact exists between Risk identification and project success.

Table 5.12: Regression

sig	f	R Square	R
0.000	15.126	0.071	0.266

The Examined (F) value was equal to (15.126) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk identification and project success.

So we accept the hypothesis:

There is an impact exists between Risk identification and project success.

H_{a1-1}: There is an impact exists between Risk Identification and the scheduled time.

To test this hypothesis, Regression was used to find out if there is impact exists between Risk Identification and the scheduled time.

Table 5.13: Regression

sig	f	R Square	R
0.000	19.889	0.091	0.302

The Examined (F) value was equal to (19.889) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Identification and the scheduled time..

So we accept the hypothesis:

There is an impact exists between Risk Identification and the scheduled time.

H_{a1-2}: There is an impact exists between Risk Identification and the planned budget.

To test this hypothesis, Regression was used to find out if there is impact exists between Risk Identification and the planned budget.

Table 5.14: Regression

sig	f	R Square	R
0.000	29.884	0.131	0.362

The Examined (F) value was equal to (29.884) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Identification and the planned budget.

So we accept the hypothesis:

There is an impact exists between Risk Identification and the planned budget.

H_{a1-3}: There is an impact exists between Risk Identification and the ability to comply with technical Specifications

To test this hypothesis, Regression was used to find out if there is impact exists between Risk Identification and the ability to comply with technical Specifications.

Table 5.15: Regression

sig	f	R Square	R
0.000	19.228	0.089	0.298

The Examined (F) value was equal to (19.228) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Identification and the ability to comply with technical Specifications.

So we accept the hypothesis:

There is an impact exists between Risk Identification and the ability to comply with technical Specifications.

H_{a2}: There is an impact exists between Risk Assessment and project success.

To test this hypothesis, Regression was used to find out if there is impact exists between Risk Assessment and project success.

Table 5.16: Regression

sig	f	R Square	R
0.000	17.859	0.083	0.288

The Examined (F) value was equal to (17.859) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Assessment and project success.

So we accept the hypothesis:

There is an impact exists between Risk Assessment and project success.

H_{a2-1}: There is an impact exists between Risk Assessment and planned budget.

To test this hypothesis, Regression was used to find out if there is impact exists between Risk Assessment and planned budget.

Table 5.17: Regression

sig	f	R Square	R
0.000	28.975	0.128	0.357

The Examined (F) value was equal to (28.975) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Assessment and planned budget.

So we accept the hypothesis:

There is an impact exists between Risk Assessment and planned budget.

H_{a2-2}: There is an impact exists between Risk Assessment and avoiding lawsuits or claims.

To test this hypothesis, Regression was used to find out if there is impact exists between Risk Assessment and avoiding lawsuits or claims.

Table 5.18: Regression

sig	f	R Square	R
0.100	2.736	0.014	0.117

The Examined (F) value was equal to (2.736) with possibility value (0.100) and it is higher than the specific value (0.05), and that shows that there is no significant impact exists between Risk Assessment and avoiding lawsuits or claims.

So we refuse the hypothesis:

There is no impact exists between Risk Assessment and avoiding lawsuits or claims.

H_{a2-3}: There is an impact exists between Risk Assessment and the ability to keep future work with other entities involved with this project was important

To test this hypothesis, Regression was used to find out if there is impact exists between Risk Assessment and the ability to keep future work with other entities involved with this project was important

Table 5.19: Regression

sig	f	R Square	R
0.717	0.131	0.001	0.026

The Examined (F) value was equal to (0.131) with possibility value (0.717) and it is higher than the specific value (0.05), and that shows that there is no significant impact exists between Risk Assessment and the ability to keep future work with other entities involved with this project was important

So we refuse the hypothesis:

There is no impact exists between Risk Assessment and the ability to keep future work with other entities involved with this project was important.

H_{a3}: There is an impact exists between Risk Response and project success.

To test this hypothesis, Regression was used to find out if there is an impact exists between Risk Response and project success.

Table 5.20: Regression

sig	f	R Square	R
0.000	41.753	0.174	0.417

The Examined (F) value was equal to (41.753) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Response and project success.

So we accept the hypothesis:

There is an impact exists between Risk Response and project success.

H_{a3-1}: There is an impact exists between Risk Response and achieving the quality standards which was originally specified in the specifications

To test this hypothesis, Regression was used to find out if there is an impact exists between Risk Response and achieving the quality standards which was originally specified in the specifications.

Table 5.21: Regression

Sig	f	R Square	R
0.000	27.725	0.123	0.350

The Examined (F) value was equal to (27.725) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Response and achieving the quality standards which was originally specified in the specifications.

So we accept the hypothesis:

There is an impact exists between Risk Response and achieving the quality standards which was originally specified in the specifications.

H_{a3-2}: There is an impact exists between Risk Response and meeting the scope of work.

To test this hypothesis, Regression was used to find out if there is an impact exists between Risk Response and meeting the scope of work.

Table 5.22: Regression

Sig	f	R Square	R
0.046	4.026	0.020	0.141

The Examined (F) value was equal to (4.026) with possibility value (0.046) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Response and meeting the scope of work.

So we accept the hypothesis:

There is an impact exists between Risk Response and meeting the scope of work.

H_{a3-3}: There is an impact exists between Risk Response and the scheduled time

To test this hypothesis, Regression was used to find out if there is an impact exists between Risk Response and the scheduled time.

Table 5.23: Regression

Sig	f	R Square	R
0.000	21.196	0.097	0.311

The Examined (F) value was equal to (21.196) with possibility value (0.000) and it is lower than the specific value (0.05), and that shows that there is a significant impact exists between Risk Response and the scheduled time.

So we accept the hypothesis:

There is an impact exists between Risk Response and the scheduled time.

Conclusion

After analyzing the data and testing the hypotheses, the following results were reached:

1. There is an impact exists between Risk identification and project success, The Examined (F) value was equal to (15.126) with possibility value (0.000) and it is lower than the specific value (0.05)
2. There is an impact exists between Risk Identification and the scheduled time, The Examined (F) value was equal to (19.889) with possibility value (0.000) and it is lower than the specific value (0.05)
3. There is an impact exists between Risk Identification and the planned budget, The Examined (F) value was equal to (29.884) with possibility value (0.000) and it is lower than the specific value (0.05)
4. There is an impact exists between Risk Identification and the ability to comply with technical Specifications, The Examined (F) value was equal to (19.228) with possibility value (0.000) and it is lower than the specific value (0.05)
5. There is an impact exists between Risk Assessment and project success, The Examined (F) value was equal to (41.753) with possibility value (0.000) and it is lower than the specific value (0.05).
6. There is an impact exists between Risk Assessment and planned budget, The Examined (F) value was equal to (28.975) with possibility value (0.000) and it is lower than the specific value (0.05)

7. There is no impact exists between Risk Assessment and avoiding lawsuits or claims, The Examined (F) value was equal to (2.736) with possibility value (0.100) and it is higher than the specific value (0.05).
8. There is no impact exists between Risk Assessment and the ability to keep future work with other entities involved with this project was important.
9. There is an impact exists between Risk Response and project success, The Examined (F) value was equal to (41.753) with possibility value (0.000) and it is lower than the specific value (0.05).
10. There is an impact exists between Risk Response and achieving the quality standards which was originally specified in the specifications, The Examined (F) value was equal to (27.725) with possibility value (0.000) and it is lower than the specific value (0.05).
11. There is an impact exists between Risk Response and meeting the scope of work, The Examined (F) value was equal to (4.026) with possibility value (0.046) and it is lower than the specific value (0.05).
12. There is an impact exists between Risk Response and the scheduled time, The Examined (F) value was equal to (21.196) with possibility value (0.000) and it is lower than the specific value (0.05).

Recommendations

1. The responsible managers must understand the risks faces by the organization.
2. Senior managers are responsible regarding communications about risk and management of risk between staff and management.
3. The organization should provide appropriate level of control regarding risks that it is faces, which include (transferring the risk and reducing the risk).
4. Monitoring the effectiveness of risk management is an integral part of management reporting as risk treatment option.
5. To management the risk effectively and efficiently, the contractor must understand risk responsibilities, risk event conditions, risk preference, and risk management capabilities.

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