



**THE INTERNATIONAL CONTRACTOR’S DECISION TO INVEST:  
A STRATEGIC RISK MANAGEMENT DECISION MODEL FOR  
PUBLIC PRIVATE PARTNERSHIP PROJECTS IN SAUDI ARABIA**

**By:**

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Philosophy in Construction Project Management**

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## **ABSTRACT**

One of the main sources of risks that influence potential project success is the project selection decision, especially for international contractor organisations looking for an opportunity to invest in public private partnership projects in foreign countries. Project selection decision, which involves the bid/no bid decision, is a critical investment decision needs to be made based on concrete project evaluation and risks identifications; where negative-risk is in place if there is an absence of a rational basis at the time of making such a decision. Thus, negative consequences of such a decision might occur.

The bid/no bid decision necessitates an effective project evaluation and risk identification from various aspects with consideration of several internal and external factors in order to achieve project success. Bidding for PPP projects overseas without efficiently applying risk management tools and techniques to evaluate both the project and the organisation's current situation and capability might result either in large losses or consumption of time and resources that could have been avoided.

The prime aim of this research is to develop a strategic investment decision model from the perspective of risk management, in order to facilitate the decisions of international contractors who intend to invest in public private partnership projects in the Saudi Arabian construction industry. This aim requires establishing a link between the risk management process and the organisation's strategy and its current situation, and identifying risks involved in the bid/no bid decision, PPP projects, and international investment in order to provide an effective computer-based model that is capable of organising the bid/no bid decision in a rational, logical, flexible, and user-friendly manner.

The pragmatic triangulation philosophy approach is adopted as the best research methodology that allows two types of research strategy to be combined in order to accomplish the research aim and objectives. Thus, the methods used are qualitative interviews and a quantitative questionnaire-based survey. The findings of this research identified critical success factors of international contractors' bidding decisions for PPP projects in the Saudi Arabian construction industry. In particular, seventy-seven factors

affecting the bid/no bid decision were used as a foundation for development of a Strategic Risk Management Decision Model (SRMDM), available at [www.srmdm.com](http://www.srmdm.com).

**Keywords:** Risk Management, Decision Model, Public Private Partnership, International Contractors, Bid/No Bid Decision.

## **DEDICATION**

To The Pure Spirit of My Father

**Mr Saad Fayez Alotaibi**

To My Mother

**Mrs Hussah Alnujaidi**

To My Love, Life, and Ever-Supportive Wife

**Mrs Jawharah Alsuheim**

And To Our **God**-Given-Gifts

**Faisal, Shouq, Shaden, Shodoon, Abdulmohsen, Shahad, and Shadan**

To My Mother-In-Law

**Mrs Faten Alaftan**

To My Sisters

**Albandari, Tahani, Sarah, and Ghadah for their love and support**

To My Brother

**Dr Mohammad Alshiha**

To My Best Friend

**Eng Ali Aldosari**

And

**For The Use and Benefit of Mankind.**

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Finally, special appreciation is also extended to those general, project, finance managers who participated in the data collection in Saudi Arabia for their generous cooperation and contribution.

# ACADEMIC REGISTRY

## Research Thesis Submission



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# CHAPTER 1: INTRODUCTION

## 1.1 Research Background

The construction industry has been widely criticised for its poor performance and the failure of projects in terms of time, cost and quality. This has motivated many researchers to search for the reasons why some projects are successful, and identify the methods used in these, and to determine the causes of project failure and how to avoid them (Alotaibi, 2009). The Latham Report (1994) and the Egan Report (1998) are considered amongst the most respected works to be employed in order to address such a subject. While the Latham Report recommends using the manufacturing industry as a reference point for implementing best practice in the construction industry, the Egan Report advises the adoption of efficient process modelling as a method of improvement for the construction industry. These two reports can be considered as the spark that has motivated and inspired many researcher to adopt and implement new techniques for needs and situations in the built environment in general and the construction industry in particular.

The increasing use of Project Management (PM) tools and techniques within the construction industry indicates their importance. The significance of these tools and techniques in encouraging the industry to improve its performance is emphasized in the Project Management Institute (PMI) definition for project management as the application of knowledge, skills, tools, and techniques to project activities to meet project requirements (Duncan, 1996). More precisely, Bageis (2008) significantly points out that the PMI definition for project management is more concentrated, from a technical point of view, on the 'how' of the management processes, where it is believed that the focus on project management activities will help to improve organisations' performance.

In addition, according to Bageis (2004) and Alotaibi (2009), there are many factors that affect the practical performance of contractor organisations, such as applying risk management tools and techniques, careful project selection, good project performance, changing the order of procedures, and the use of expert advisors. In fact, a masters' dissertation conducted in the Saudi construction industry identified the lack of project evaluation through applying risk management tools and techniques, especially amongst

small-to-medium sized construction organisations, as the major reason for project failures in terms of time, budget, and quality, and in some cases, the failure in constructing the whole project, leading to disputes and large financial losses for the contractor organisations. (Alotaibi, 2009).

Ahmad (1990) also points out that careful project selection is a key factor contributing to the contractors' practical performance, in that bid/no bid decisions are found to affect the long-term performance of the construction firm. Lowe and Parvar (2004, p. 643) support Ahmad's point of view, stating that "the improvement of the contractor's selection of project would give significant benefits to the construction industry and consequently to its client". Thus, the project selection decision is one of the most critical business decisions, and, in order to achieve success, contractor organisations should recognise the importance of the bid/no bid decision and project evaluation before committing themselves to a project.

The international investment decision-making issues that will be discussed in this research are the problems of making the bid/no bid decision and/or the project selection decision that faces the contractor organisation. Egemen and Mohamed (2007) explain that decision-making during the strategic phase of the project includes two separate decisions; the bid/no bid decision and the mark-up decision. Previous studies suggest that these two decisions are strategically separate; however, in spite of the focus of these previous studies on 'the mark-up decision', the bid/no bid decision has received less attention (Abdul-Hadi, 1990; Shash, 1998; Wanous *et al.*, 1998; Lowe and Parvar, 2004; Egemen and Mohamed, 2007; Bageis, 2008).

In addition, in order to accomplish the project successfully, the project nature and specifications should be considered; where risks are present, the appropriate project selection, evaluation, and risk identification are crucial to achieve successful bidding decisions by international contractors (Han and Diekmann, 2001a; 2001b). Further, as Bageis (2008, p. 3) points out "*supporting the decision-maker with the relative information needed to make the decision is required. Providing contractors with such a process and methodology seems to be more important than helping them to predict the decision without any rational basis*". Hence, the decision should be based on logical

reasoning and consideration of the project's features, in order to enhance the contractors' capability to accomplish the project successfully.

Bid/no bid decisions as models for contractor organisations have been investigated in previous studies. In particular, the most discussed models in literature are seven models that have been developed to help contractors choose the right bidding decision for construction projects, and these are as follows:

- Worth assessment technique (Ahmad, 1990);
- Analytical hierarchal process (Abdelrazig, 1995);
- NeuroFuzzy expert system (Wanous, 2000a);
- Parametric solution (Wanous *et al.*, 2000b);
- Artificial neural network (Wanous *et al.*, 2003);
- Logical regression and reasoning techniques (Lowe and Parvar, 2004); and
- Bid/no bid decision model (Bageis, 2008).

However, there is no previous model that fulfils the following gaps:

- 1) Linking the organisation's strategy with the project selection decision;
- 2) Linking the organisation's current situation with the project selection decision;
- 3) Considering risk factors in mega-projects in the Saudi construction industry;
- 4) Considering critical success factors for public-private partnership projects;
- 5) Considering critical success factors for international construction;
- 6) Considering the different size and experience of contractor organisations; and
- 7) Facilitating the above elements in an easy and user-friendly web-based decision model.

In details, after studying the previous decision models that considered the bid/no bid decision, gaps and drawbacks have been found in relation to international investment and public private partnership projects, in addition to the gap in linking such a vital decision with the organisation's strategy, policies, and current situation. Thus, an opportunity exists for this research to contribute to filling these gaps. Thus, this study is the first of its kind, in many aspects, as it links 'strategic management' with 'bid/no bid decision' from the perspective of 'risk management' for 'public private partnership projects' by 'international investors' in 'the Saudi Arabian construction industry' and considers the

strategy, policies, and current situation of international organisations' in parallel with all of the factors and barriers to entry. Finally, it facilitates combining all these elements, with considerations of differences between small-to-medium-to-large sized contractor organisations, in an easy and user-friendly web-based Strategic Risk Management Decision Model (SRMDM).

Therefore, the aim is to create a strategic decision model to depict factors that affect project success from the perspective of risk management, by considering specific aspects of the project, such as the barriers and success factors of public private partnership schemes and the involvement of international contractor organisations, in parallel with the project's characteristics, strategic project management, and the organisation's strategy, policies, and current situation.

Additionally, the main motivating factors on which this research is based constitute the need for an effective web-based model that organises the bid/no bid decision in a rational, logical, flexible, and user-friendly manner, with consideration of risks involved in international PPP projects, success factors of PPP and international construction projects, and international contractors' barriers to entry overseas project. Designing such a web-based model will support this research in many aspects as follow: 1- To be used for validating the model's concept; 2- To provide decision-makers with a strategic tool that can be used for bid/no bid decisions for their potential projects; and 3- To simulate the real situation in the practical field for the end-user in terms of the contractor organisations classification status, annual volume size, and the type of main client.

## **1.2. Construction Industry in Saudi Arabia**

Falqi (2004) points out that the construction industry in Saudi Arabia confronts many challenges, some of which can be considered unique to the country, while others are common worldwide throughout the construction industry. In addition to the fact that owners share the three basic concerns of time, cost, and quality, there is considerable concern regarding the type of contract documents that can ensure the capability of transmitting all of the owners' requirements to the main contractor. In this study, the unique issue faced by the public authorities and international investors' contractors is the use of PPPs as a scheme to implement construction projects in Saudi Arabia, as the Saudi

Government intends to build six new economic cities and to link the whole country by a modern railway networks. Due to the lack of experience in these types of projects by both local private and public sectors, the Saudi Government is trying to attract international contractors to invest in such mega-projects. From the Government perspective, although the PPP scheme helps economically, the focus in using such a scheme is to guarantee the required quality desired by authorities.

Falqi (2004) further explains that construction experts in Saudi Arabia have long recognised the extreme fragmentation of the industry, whereby the majority of contractors' organisations are small, unspecialised, undercapitalised, and financially unstable. In addition, in most construction projects the use of sub-contractors has become common practice, with specialised firms carrying out the majority of the work. Thus, these mega-projects are real challenge to international contractors who will need to involve local contractors in order to undertake the projects.

Regarding the performance of the construction industry; the results of Falqi (2004), in his research on delay factors for construction projects in Saudi Arabia and the United Kingdom, indicate that, in the UK, the average ratio of actual completion time of construction projects compared to the planned contract duration fluctuates between 110% and 130%. However, this research found that in Saudi Arabian construction industry projects delays are considerably longer than in the UK: 21% of respondents from SA had experienced a delay that ranged from 131% to over 200% of the planned duration. In general, in the case of the Saudi construction industry, the majority of delayed projects could be considered as 'excusable delays', where owners bear the damages for all delayed time. However, in Falqi's research, only 11% of SA respondents testified that contractors had paid liquidated damages for projects which incurred time delays.

Currently, the Saudi Government has ambitious plans to build six new economic cities under the PPP scheme. At a cost of more than \$60 billion, the Kingdom has planned and begun constructing four 'metropolitan marvels'; a project that promises to significantly alter the economic landscape of Saudi Arabia while providing a wealth of 'greenfield' opportunities for investors. The Saudi Arabia General Investment Authority (SAGIA) has launched four integrated Economic Cities, located in Rabigh (King Abdullah Economic City), Hail (Prince AbdulAziz bin Mousaed Economic City), Madinah (Knowledge



Economic City) and Jazan (Jazan Economic City). According to SAGIA (2008), the objectives of these economic cities are to:

- Attract international investment to Saudi Arabia;
- Assist small and medium construction organisations (via sub-contracting and skills improvement);
- Upgrade competitiveness;
- Promote balanced regional development;
- Achieve economic diversification; and
- Create job opportunities for citizens.

SAGIA's vision for the Economic Cities is to contribute more than US\$150 billion in annual GDP, to create over a million jobs, and to become home to 4-5 million residents by 2020. Serving the wide-ranging needs of these large communities will require high levels of private sector involvement. Fully utilizing their commercial and industrial potential will offer even greater opportunities for investment. Currently, according to the Economic Cities Authority (ECA, 2014) few projects in some economic cities have started.

In a further project under the PPP scheme involving international contractor organisations, the Saudi Railway Organisation (SRO) intends to link the Saudi regions with modern railway networks and services. According to the SRO's plans for the future of transport in the Kingdom of Saudi Arabia, in 2025 the expected share of the railway sector for the transport of passengers would stand at 11% when compared to other means of transportation for distances of 380-500 km. It would also be expected to have an estimated 12.5% share of the 850-980 km range, and 9% of the share in the case of distances of 1250-1400 km. Furthermore, the SRO's plans estimate the growth rate up to 2025 to be 3.7%. With regard to the transportation of goods, it has been estimated that the share of the railway sector in 2025 will be 24% for a distance of 300 km, 40% for a distance of 900 km, and 48% for a distance of 1400 kilometres. The growth rate during this period is estimated to be 4.8% per year. Based on these studies, estimates, and other stimulating factors, the Saudi government has adopted a strategic plan to develop railway services in the country: this plan includes a number of major projects to expand the railway network and services, and a program to privatise the SRO.

The Saudi Ministry of Economy and Planning (MEP) encourages small- to medium-sized construction organisations to contribute to the delivery of these mega projects. It is encouraging them to seek knowledge and experience and to adopt new tools and techniques, in order to overcome the obstacles such as uniqueness, complexity, size and technology, which often surround such large projects. According to the MEP's vision, small- to medium-sized private construction organisations will play a key role in Saudi development.

However, small-to-medium-sized private construction organisations will be required to adopt and accept new knowledge and techniques in order to improve their performance and to accomplish projects successfully within time, cost, and quality specifications. Alotaibi (2009), after examining the Saudi construction industry via the Project Management Maturity Model (ProMMM), points out that the results showed more than half of the Saudi contractor organisations (63.1%) to be between level one 'Naïve' or level two 'Novice' in terms of the ProMMM. This means that the majority of Saudi construction organisations have no, or very limited, awareness of the project management profession and its tools and techniques. Moreover, the same study found that the lack of use of risk management tools and techniques is the main reason for project failure, leading to exceeding the time and budget agreed and to liquidating damages.

### **1.3. Statement of the Problem**

One major reason that projects are procured by PPPs, is to enhance value for money by inviting the private sector to handle public works projects. However, although PPPs have been increasingly used in procuring capital-intensive infrastructure projects all over the world, research shows that unless the risks in terms of financial, technical, managerial, environmental, and social issues are properly analysed, allocated and managed, the goals of a true value-for-money and a win-win partnership are unlikely to be attainable (Cheung *et al.*, 2009). In PPP arrangements, the government's role in the delivery of infrastructural and public services changes from owner/manager to overseer, where the investors take on far more responsibilities and assume more complicated risks than a mere contractor (Chou, 2012). As a result, by using PPP schemes, public sectors aim to transfer as many risks as possible to private enterprises and thus shed their responsibilities. This, indeed, requires a deeper evaluation of projects and very careful risk identification by investors

in order to be fully prepared to accomplish the project and to achieve success (Lowe, 2007).

Furthermore, Chou (2012) explains that each party engaged in PPPs will require a risk surcharge for every risk conveyed. How to fairly distribute the responsibilities, risks and potential benefits between public and private sector bodies, or how to achieve the best possible risk transfer, as compared to maximum risk transfer, when dealing with risk in PPP projects, deserves further consideration in research on PPPs. Thus, it is highly important for both the public and private sectors to understand the various risks associated with PPPs throughout the complete life cycle of projects, and especially in the strategic phase of a project, in order to guarantee a successful investment decision that leads to long-term success. The decision to invest, that is, the go/not to go or the bid/not to bid decision, is in fact the first step in the strategic phase of any project. If such a decision is based on a solid and concrete foundation, it will be the key to open the gate to success.

This is especially true in Saudi Arabia and other countries where the use of PPPs are still in the early stages of development. Currently, the Saudi government is adopting PPP schemes for constructing mega development projects, such as the new economic cities and railway networks, in order to attract international investment to Saudi Arabia, as well as to avoid the constraints and risks associated with the delivery of such large projects. However, this new procurement approach is more prone to risk than projects executed under direct government finance (Ogunlana, 1997).

As for those international contractor organisations seeking investment overseas, Lowe (2007) points out that statistics indicate that the number of conflicts and disputes on international construction projects are much higher than in domestic markets. In detail, *“international construction projects have high levels of risk and complexity, which result in greater possibilities of overrun and conflict when compared with domestic projects”* (Zhi 1995; Han and Diekmann 2001; Gunhan and Arditi 2005; Han *et al.* 2008, as cited in Eybpoosh *et al.*, 2011, p. 1164).

Therefore, it is essential for international contractor organisations to gain a detailed understanding of the root causes of the types of conflicts and disputes which conflicts and disputes, which are specific to conducting business in foreign environments, before

making any decision to invest internationally. This detailed understanding of such roots for conflicts and disputes necessitates the need for careful projects' evaluation and robust risk identification by investors in order to be fully prepared to accomplish the project and to achieve success. The decision to enter international construction markets can arise for a variety of reasons, but the fundamental motivation for organisations seeking work abroad and taking advantage of international opportunities, is to increase their rate of growth and profits, and to develop their level of competition with other participating organisations (Howes and Tah, 2003; Lowe, 2007).

However, researchers have found that there are primary strategic risks associated with international construction, such as political, economic, financial, climatic and geographical risks, in combination with the need to understand the legislative and cultural environments of foreign countries. All of these risks, in addition to the risks related to each project's characteristics, should be considered and addressed prior to making the decision to invest abroad.

Bageis (2008) explains that the bidding decision is the first stage of commitment to a project and will be followed by a series of consequences, whereby if the decision was correct, the consequences will be positive, and vice versa. Thus, the strategic decision will affect all the project phases and that will result in either the success or failure of the project and even of the organisation itself.

In addition, Ofori (2003), Lowe (2007), Cheng *et al.* (2011), and Osei-Kyei and Chan (2015) highlight that there are no existing models that are specifically applicable to international construction; especially for PPP projects in developing countries. Therefore, there is a strong need for a strategic bid/no bid decision model for international investment dedicated to public private partnership projects from the perspective of risk management, and such a tool would help both international organisations and countries engaging in PPP projects to achieve success. It is the intention of this research to develop such a model. Based on the above statement, the research questions that this study intends to address are:

- Are the methods, tools, and techniques of risk management currently applied by international and/or Saudi contractor organisations for their projects in Saudi

Arabia adequate in order to achieve project success in general, and success in the investment decision in particular?

- Do international and/or Saudi contractor organisations use a bid/no bid decision model in order to evaluate projects before entering the bidding stage?
- Should the bid/no bid decision model take into account the risks and success factors of PPP schemes and international investment in parallel with the project's characteristics, and link these to the organisation's strategy and current situation?
- Can the development of such a model contribute to enhancing the success of the project and to improve the performance of the organisation?
- Can the development of a web-based model help to facilitate the process of making the bid/no bid decision?

In view of the above, this research aspires to provide solutions that can be recorded and developed in order to obviate the problems in the construction industry and to encourage organisations to apply systematic project management approaches and risk management tools and techniques as a routine way of working, rather than cherry-picking some tools and techniques.

#### **1.4. Research Aim and Objectives**

The prime aim of this research is to provide a strategic investment decision model, from the perspective of risk management, for international contractors who intend to invest in public private partnership projects in the Saudi Arabian construction industry. In order to achieve this aim and, also to address the research questions, the key objectives of this research are defined as follows:

- 1) To establish a link between risk management processes, the organisation's strategy and its current situation, to facilitate the process of making the bid/no bid decisions;
- 2) To investigate the different behaviours of contractor's organisations during the process of decision-making, according to their differences in terms of classification status, size, main client type and type of work;
- 3) To identify key factors affecting bid/no bid decisions for potential construction projects;

- 4) To identify critical success factors for public-private-partnership projects from the perspective of risk management;
- 5) To identify critical success factors for international construction projects from the perspective of risk management; and
- 6) To construct a web-based strategic decision model of PPP projects for international investors from the perspective of risk management that can accommodate the previous objectives, in order to facilitate the process of decision making.

## **1.5. Research Motivation**

Bageis (2008) points out that the bid/no bid decision is the first decision that a contractor makes on a project, and the careful understanding of the potential consequences of this decision for the organisation is a key factor in the success of the project and of the organisation. Furthermore, many studies have discovered that the bid/no bid decision is often made without a rational basis (Ahmad and Minkarah, 1988; Chua and Li, 2000; Wanous, 2000a; Wanous, 2000b; Wanous *et al.*, 2000; Egemen and Mohamed, 2007; and Bageis, 2008). This also applies to international investment decisions, where the importance of considering the bid/no bid decision is even more crucial. Thus, international contractor organisations should consider more carefully the risks and uncertainties surrounding international construction PPP projects.

Moreover, Lowe (2007) points out that statistics indicate that the level of conflicts and disputes on international construction projects are much greater than in domestic markets. Risks, conflicts, and disputes that lead to project failure and the probability of bankruptcy of the organisation and party prosecution are all possible outcomes in public private partnership projects.

The rationale behind selecting this topic is as follows: the researcher's personal interest in generating knowledge about how international contractors make decisions on issues related to their investment; how international contractors practise the activities of project and risk management and, in particular, how a successful partnership relationship can be achieved between parties involved in investment in PPP projects in the Saudi Arabian construction industry. This personal interest began after finding the results of a master

degree dissertation conducted by the researcher in 2009 regarding the maturity level of project management in the Saudi construction industry. These results of the master degree dissertation indicated to the poor performance of project management in general; and particularly to the poor performance of risk management tools and techniques amongst the majority of contractor organisations in the Saudi construction industry. Thus, with the current orientation of the Saudi public sector towards attracting international investors to invest in PPP projects, taking into consideration the immature PPP implementations in the Saudi construction industry, the researcher's personal interest increased to read more about risks, PPPs, and international contractors' entry to developed countries.

As it is the first step towards the commitment of a project, investigating the current procedures of bid/no bid decision-making provides the researcher with the opportunity to gain this knowledge. It is a strategic decision that should be made with wide consultation, as the investment decision has been proven to be one of the most critical decisions that contribute to the survival of the international contractor organisation.

In addition, the need for an effective web-based model that organises the bid/no bid decision in a rational, logical, flexible and user-friendly manner, with consideration to risks in PPP projects, success factors of PPPs, and success factors of international investment, is one of the main motivating factors for this research. Another motivation is to construct this model with a linkage to the contractor organisation's strategy and current situation, where the strategy will be in terms of policies influencing the organisation's behaviour towards bid/no bid decisions.

Finally, after studying the previous decision-making models that considered the bid/no bid decision, it has been found that there are gaps and drawbacks where international investment and public private partnership projects are concerned: therefore, the opportunity exists for this research to contribute to the filling of these gaps. This study is the first of its kind and its aim is to create a strategic decision model to depict factors that affect project success from the perspective of risk management, by considering the variable aspects of the project as possible barriers or success factors in public private partnerships and international investment, in parallel with the project's features, strategic project management, and the organisation strategy. Many aspects will be combined and

merged logically and rationally, based on science and knowledge, to facilitate such a critical decision from the perspective of risk management.

The findings of the proposed study will present a strategic RM decision model that will assist in implementing project management effectively and achieving project completion successfully. The research will make specific contributions to PM; RM; PPPs; International Construction; and Decision Making Literature, which will encourage researchers to support their arguments by conducting further studies. Also, the researcher's findings will make a practical contribution to both private and public sector organisations. In brief, this study revises seventy-seven factors considered to be the most important factors out of two hundred and thirty-seven factors identified from the literature that affect the bid/no bid decisions, presents the final conceptual model in Chapter 8; and finally applies both the factors and the conceptual model to construct a web-based model called Strategic Risk Management Decision Model available online at [www.srmdm.com](http://www.srmdm.com).

## **1.6. Structure of the Thesis**

The thesis comprises eight chapters: Introduction, Literature Review, Research Methodology, Qualitative Research Strand, Quantitative Research Strand (1), Quantitative Research Strand (2), Construction and Validation of the Model, and ends with Thesis Conclusion. Figure 1.1 below shows how the study has been conducted and reported.



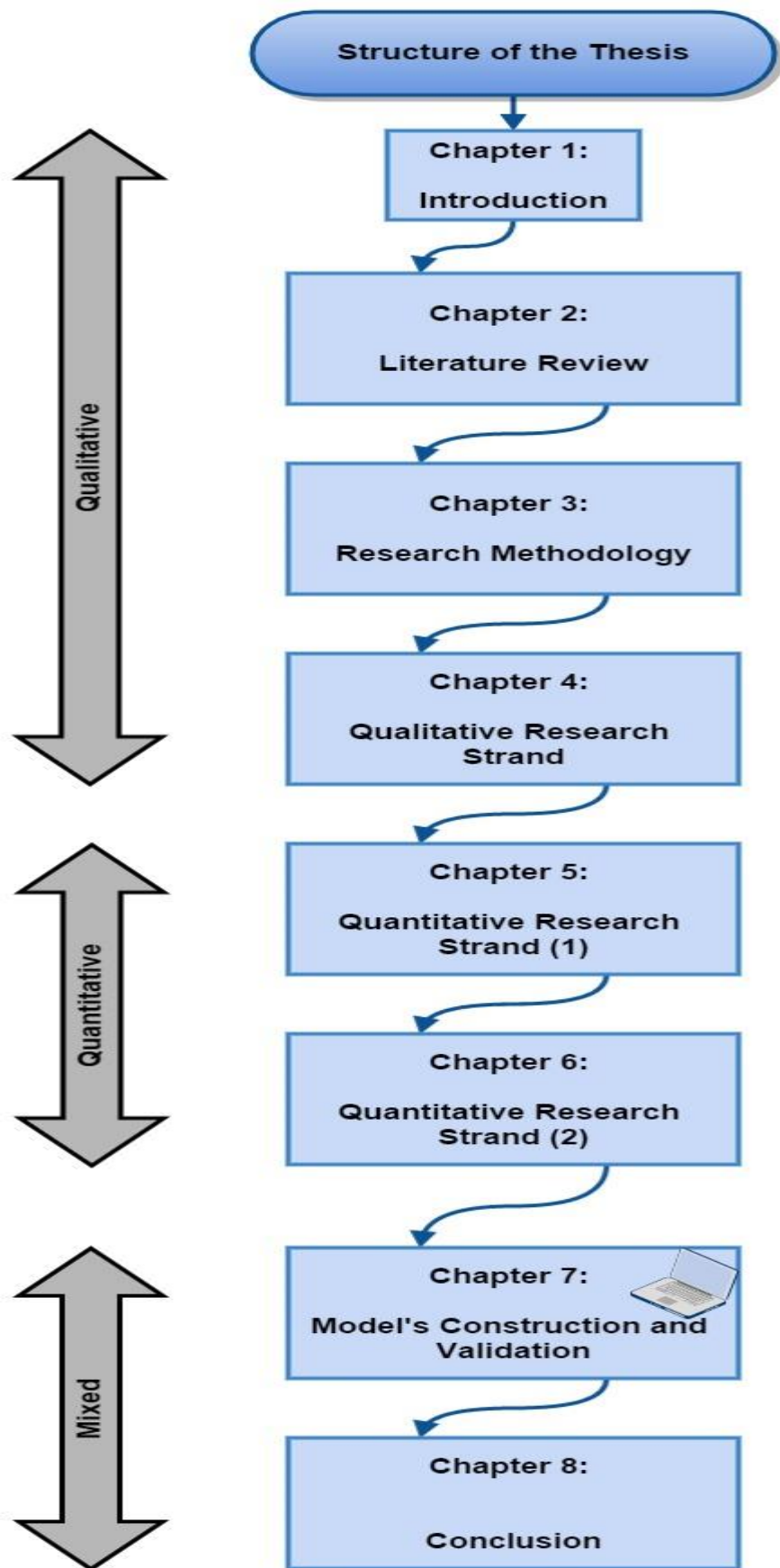


Figure 1.1: Thesis Structure

## **CHAPTER 2: RISK MANAGEMENT IN BID/NO BID DECISIONS**

*“The world has dramatically changed over the past 30 years and continues to do so. Today, everything happens at a lightning – fast pace. Every activity is more demanding and competitive than it’s ever been. Today we all face challenges more complex those that confronted us in decades past. As the pace picks up, we are asked to do more, and we must do it well”* (Schmidt, 2009).

### **2.1. Introduction**

After highlighting the research gap and identifying the research aim and objectives in the previous chapter, this chapter carries out the first phase of the research design in order to address the prime aim of the research. The research design, which will be described in more detail in Chapter Three, begins with a qualitative literature review to gather adequate knowledge and background related to the research subject. The target is to justify the research problem, the path of the research, and the appropriate research approach. Thus, previous studies and relative literature reviews concerning the research subject are carefully and qualitatively considered.

In this research, the literature review chapter focuses on the findings and insights of other researchers in relation to risk identification for the bid/no bid decision in a construction project. This chapter first addresses the practice of strategic project management. It also investigates the importance of careful project selection and summarises previous models in terms of their inputs and factors to address any obstacles. This sheds light on the gaps identified in the relevant literature pertaining to the need for strategic decision models suitable for projects involving international contractors under public-private partnership schemes in the Saudi Arabian construction industry from the perspective of risk management.

### **2.2. Background Knowledge and Understanding of Thesis Topics**

This research touches on concepts related to the research subject; typically in a sequential consistency form that are necessary for the sake of logic, accuracy, and fairness to address the research problem. These key concepts on which this research is based comprise

Strategic Project Management, Project Selection, Decision-Making, Risk Management (RM), Public Private Partnership (PPP), and International Construction. First it is necessary to consider the nature and purpose of research into these types of topics. Then the following sections will cover the each topic separately.

According to van Aken, (2004), the nature of the product of a given research is basically influenced by its research paradigm; where the term research paradigm refers to a combination of the research questions, the methodologies adopted, and the nature of the expected research products. In attempting to position the nature of construction management research within the context of the sciences, Koskela (2008) intimates that an understanding of the character of a given science is seen to be highly significant to the success of that science, and that the research questions tackled, methodologies used, and outcomes produced are the key concerns.

Understanding means the ability to describe, explain and possibly predict (Nagel, 1979; Emory, 1985). Thus, most academic research in management is based on the notion that ‘understanding’ is the mission of all science (van Aken, 2004). Several non-positivists even uphold the view that the mission of every science is to create a certain shared understanding of a particular phenomenon (Peirce, 1960). It is however worth noting that understanding a given problem only provides a foundation to its solution. The ensuing step should involve developing solutions that have been tested and proven workable.

The methodology for the natural and social sciences whereby the focus is on ‘how things are’, disregards the question of ‘how things ought to be’ (Koskela, 2008). An answer to the question of ‘how things ought to be’ should lead to developing innovative solutions to problems in the real life. The emergence of a research paradigm, the product of which is not to describe and explain the world, but to transform it with an innovation, is manifested in various fields. Thus, this research, in order to achieve its strategic intent, is attempting to comprehend the relationship between knowledge concepts mentioned above; and then to find the best possible method towards providing the desired solution. For this purpose, knowledge understanding is required to achieve a better and logical understanding. These knowledge will be discussed and linked to the research subject in this chapter. Hence, strategic project management will be discussed first in order to clarify its impact on the strategic decisions to be taken by decision makers. Thence, the

importance of bid/no bid decision as a strategic decision will be discussed with further details regarding risks and critical success factors influencing such a decision.

### **2.3. Strategic Project Management**

Nowadays, we all deal with projects in one way or another, whether as sponsors, team members, project managers, or stakeholders. In fact, our job titles may not include the term ‘Project Manager’ but nevertheless managing projects is a given in any form of professional work (Schmidt, 2009). For this, it would be appropriate to take a moment to define what a project is and is not. According to Kerzner (2009, p. 2), the Senior Executive Director for Project Management at the International Institute for Learning (ILL), a project can be considered to be any series of activities and tasks that:

- Have a specific objective to be completed within certain specifications;
- Have defined start and end dates;
- Have funding limits (if applicable);
- Consume human and nonhuman resources (i.e., money, people, equipment); and
- Are multifunctional (i.e., cut across several functional lines).

From this definition it can be concluded that a project is temporary, unique, and has a well-defined scope. The next step is to define project management in order to understand this term. According to the Project Management Institute (PMI) (2013, p. 5): “*project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements*”. Kerzner (2009, p. 4) expands this definition to be: “*project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives. Furthermore, project management utilizes the systems approach to management by having functional personnel (the vertical hierarchy) assigned to a specific project (the horizontal hierarchy)*”.

Both definitions of project management, like the definition of a project, highlight certain characteristics that are important to project management. On the one hand, Callahan and Brooks (2004) point out that the most important characteristic of project management is that it is oriented toward achieving results; and the whole purpose of project management

is to accomplish the business result that is desired. On the other hand, it is argued that project management is not an end in itself; it is a process to achieve an end (Callahan and Brooks, 2004; Schmidt, 2009; Kerzner, 2009).

Further, Callahan and Brooks (2004) point out that although implementing traditional project management tools and techniques are essential for projects' success, it is the implementation of strategic project management that can help organisations to achieve success on both project and organisational levels. This point of view is supported by many authors as Schmidt (2009); Termini (2009); Harris (2009); Moore (2010); and Kaiser *et al.* (2015).

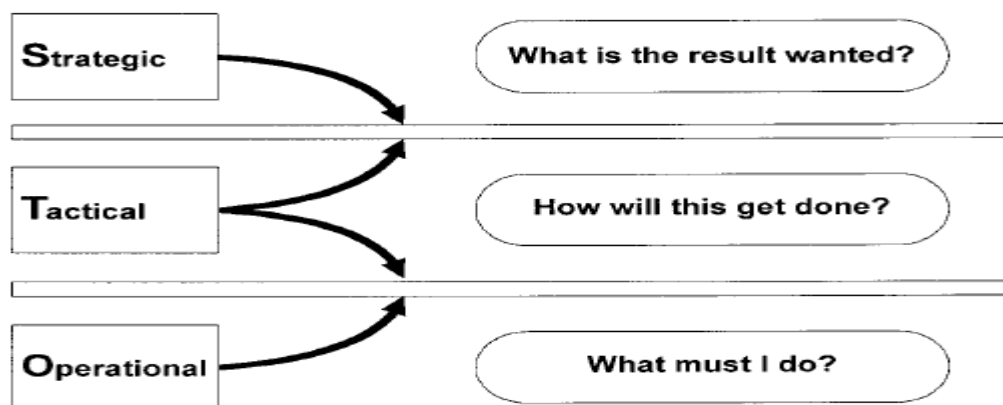
Thus, for an organisation to be successful, all that is needed is “*a Strategic Project Management approach, not the tactical task/schedule focus that dominates traditional project management*” (Schmidt, 2009, p. 6). In order to define what strategic project management is, the term strategy should be clarified first. According to Chevalier-Roignant and Trigeorgis (2011) there is more vacuity about strategy than about any other topic in business today. Although it is commonly agreed that strategy is critical in today's changing corporate environment, there is no universally agreed-upon definition of business strategy.

However, there are two well-known definitions in the business context. The first definition was introduced by Chandler (1962) states that strategy is “*the determination of the basic long-term goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources necessary for carrying out these goals*”, while a later definition by Mintzberg *et al.* (2002) defines strategy as “*the pattern or plan that integrates an organisation's goals, policies and action sequences into a cohesive whole*”. It can be noticed that both definitions of strategy emphasise the formulation of a vision and strategic goals, and then finding methods to achieve them (as cited in Chevalier-Roignant and Trigeorgis, 2011, p. 10).

Further, regarding the notion of strategic project management, according to Callahan and Brooks (2004, p. 24) it can be defined as “*the use of the appropriate project management knowledge, skills, tools, and techniques in the context of the company's goals and objectives, so that the project deliverables will contribute to company value in a way that*

*can be measured*'. In other words, the definition necessitates linking projects to the organisation's vision and strategic goals by applying the required methods.

In order to understand the real problem of the traditional project management approach, and why many authors are recommending that strategic project management should be adopted in its place, Callahan and Brooks (2004) explain that, in each construction organisation, three main levels exist: strategic, tactical, and operational levels. At the strategic level, a strategic person is concerned with how to improve productivity and profitability and to increase the organisation's value and return on investment. In other words, those at the strategic level ask: 'What is the result wanted?', and for that reason, they are not concerned about how things will be done; but about what needs to be done in order to make the organisation successful. That is why, as the situation relates to project management, there is often little or no input between the strategic level and the tactical level, where the strategic person considers project management to be a tactical problem. Thus, it is as if a brick wall is constructed between the two levels, as can be shown in the following figure (Figure 2.1).



**Figure 2.1: The STO Model**

*Source: Adapted from Callahan and Brooks (2004), Essentials of Strategic Project Management.*

On the other side, Callahan and Brooks (2004) explain that as regards to the tactical level, the tactical person asks: ‘How will this get done?’; as this person is generally concerned with how to achieve the priorities as envisioned by the executive, with the resources at hand. In fact, Callahan and Brooks (2004, p. 14) argue that “*if all project decisions are made at the tactical level, then there is no oversight from a group that has a global vision of the company*”.

Finally, regarding the operational level, the operational person is concerned with the question: ‘What must I do?’ These people actually get the work of the project done. They are concerned about how they will get their regular job done and do all of the project work besides. As this is the situation when applying the traditional project management approach, the frustration described above is the result when lines of communication between the strategic (executive), the tactical (management), and the operational (employee) are not open (Callahan and Brooks (2004).

In the light of this problem, and bearing in mind the definitions above for the project, the organisation’s strategy, and strategic project management, management of projects must be aligned with the mission, goals, and objectives of an organisation so that the projects move the organisation recognisably closer to achieving its business outcomes with the organisation’s limited resources (Callahan and Brooks, 2004; Schmidt, 2009; Termini, 2009; Harris, 2009; Moore, 2010; Kaiser *et al.*, 2015).

## **2.4. Project Selection**

The project selection decision, with respect to strategy and strategic project management, is actually a critical and strategic process, which involves two business decisions, the bid/no bid and the mark-up size decisions (Shash, 1993; Lowe and Parvar, 2004; Bageis, 2008; Wang *et al.*, 2009; Moore, 2010; Dutra *et al.*, 2014; Shafahi and Haghani, 2014; Tofighian and Naderi, 2015). In order to achieve successful project selection, Lund *et al.* (1989) first defined project selection as a series of steps, which progresses from the continuous collection, analysis, evaluation and judgment of the project information, and then selection of the appropriate project to making the determination to bid for the project based on the specific circumstances of the project and the organisation’s marketing strategy.

However, the problems of project selection have been given further attention in the literature since this definition was introduced. The constant changes in technology and market conditions, associated with more demanding customers, generate a quest for innovation and better results in contractor organisations. Particularly, as contracting firms are project-oriented firms in which their profit is related to the number of projects awarded, many of those firms have been criticised for their performance towards the project selection process, where little attention has been paid towards careful project selection (Lowe and Parvar, 2004; Bageis, 2008; Wang *et al.*, 2009; Moore, 2010; Dutra *et al.*, 2014; Shafahi and Haghani, 2014; Tofighian and Naderi, 2015). The following subsections will reveal how strategic project management can guide project selection to achieve success in strategy implementation.

#### **2.4.1. The Organisation's Strategy and Project Selection**

Moore (2010, p. 21) points out that although many organisations have a well-defined and well-scoped strategic process, the execution of their strategy is the critical challenge. Indeed, it is widely recognised, that weakness in execution, but not weakness in the strategy, is one of the main reasons for CEO failure. And to overcome such a condition, *“it is important to tie the strategic theory governing the business to the experience of project management. Without this linkage, either the project portfolio is blind to the needs of the business or the strategic goals are empty, with no support at the execution level. It is clear that this is an area that businesses must get right for long-term success”*.

Moore's point of view is widely supported by many authors in the literature. These supporting studies also emphasise that in the real world competitive markets, where fiscal solvency 'resources' play a significant role in defining the optimal state, the selection of the most appropriate projects for which to bid is fundamental to a successful commercial strategy that can help organisations when faced with pressures of surviving the vagaries of the market. Actually, for this reason, contractor organisations are required to be selective, to put the organisation's strategy first, and to align their selection with both strategic goals and the organisation's portfolio (Dutra *et al.*, 2014; Shafahi and Haghani, 2014; Kaiser, *et al.*, 2015).



Callahan and Brooks (2004) explain that, from the strategic level of a contractor organisation to the operational level, the strategy must be identified clearly in terms of a main vision and long-term strategic goals. Also, aligning the strategy with projects should be applied through adopting strategic project management with the project portfolio management (abbreviated PPM and also known as enterprise project management, or EPM) as a key component of the strategic project management for careful and successful project selection. Thus alignment of strategy with project selection is stressed as the path to success, in order to achieve both the success of the organisation and the projects (Bageis, 2008; Chen and Askin, 2009; Ghorbani and Rabbani, 2009; Wang *et al.*, 2009; Moore, 2010; Bhattacharyya *et al.*, 2011; Liu and Wang, 2011; Tseng and Liu, 2011; Dutra *et al.*, 2014; Shafahi and Haghani, 2014; Tofighian and Naderi, 2015).

Furthermore, contractor organisations are subject to a competitive environment, where securing projects will be either by direct invitation and negotiation or by competitive bidding. In such a competitive environment, linking project selection to the organisation's strategy and portfolio is crucial to control resources and to achieve long-term success (Shash, 1993; Lowe and Parvar, 2004; Bageis, 2008; Shafahi and Haghani, 2014).

Bearing in mind the STO diagram (Figure 2.1, page 19), the strategic vision and goals should be linked to the tactical/project level and to the operational level as well. Moore (2010, p. 23) emphasises that "*the strategic goal definition must come before project selection, it must not be rushed. Selecting the right strategy is imperative for running an impactful portfolio*". Further, Bageis (2008) clarifies the method to link projects to the organisation's strategy as translating the strategy within the organisation's activities into policies and standards, and that these policies should guide the actions or subsequent results of the actual decision behaviour, and also entail that the strategic goals will be reasonably broad for each level's activity.

#### **2.4.2. The Relation between the Organisation's Current Situation and Project Selection**

Several studies interested in careful project selection emphasise the importance of assessing the organisation's current situation in terms of the organisation's capability and resource availability to select and commit to a project (Mannerings, 1970; Mak, 1977; Lifson and Shaifer, 1982; Ahmad, 1990; Skitmore *et al.*, 1992; Shash, 1993; Bageis and

Fortune, 2009; Jarkas *et al.*, 2014; Shafahi and Haghani, 2014; Tofighian and Naderi, 2015). According to Bageis (2008), there are internal and external factors which affect the project selection decisions, but only a few studies linked these factors to the organisation's strategy.

McGrew and Wilson (1982) suggested that, at that time, an organisation did not in practice have a single set of goals with an agreed order of preference among them. Thus, they emphasised that having explicit goals within the organisation is important in establishing the link between selection of a project and the goals of the organisation. Managing the company projects is important not only for the project level but also for the organisational level. Goals and objectives of the organisation should be defined and recognised first for better enterprise project management performance. Also, Cooke-Davies (2002) points out that the importance of enterprise/organisational project management (EPM) comes from the orientation of the construction company, as it is clear that a contractor's organisation is a business discipline 'projects orientation', whose main goal is to carry out construction works or services at a specified price for a client. Furthermore, Cooke-Davies observes that managing the contractor's business is divided into two levels; the organisational level (corporate level) and the project level, but in fact, the success of one of the levels is linked to the success of the other.

In more detail, Dinsmore (1999) points out that the project management discipline considers the project's level in order to plan, organise, direct and control the company resources for a project, which means that the project management discipline is applied to manage projects with relatively short-term objectives in comparison to the portfolio/programme project management, whereas enterprise project management is concerned with the corporate level of an organisation, in order to attain goals by applying strategic project management not only to single projects but also at the enterprise level. In other words, as Al-Balushi, (2006) points out, enterprise project management (EPM) applies business processes, methods, standards and tools within an organisation to manage their business through projects.

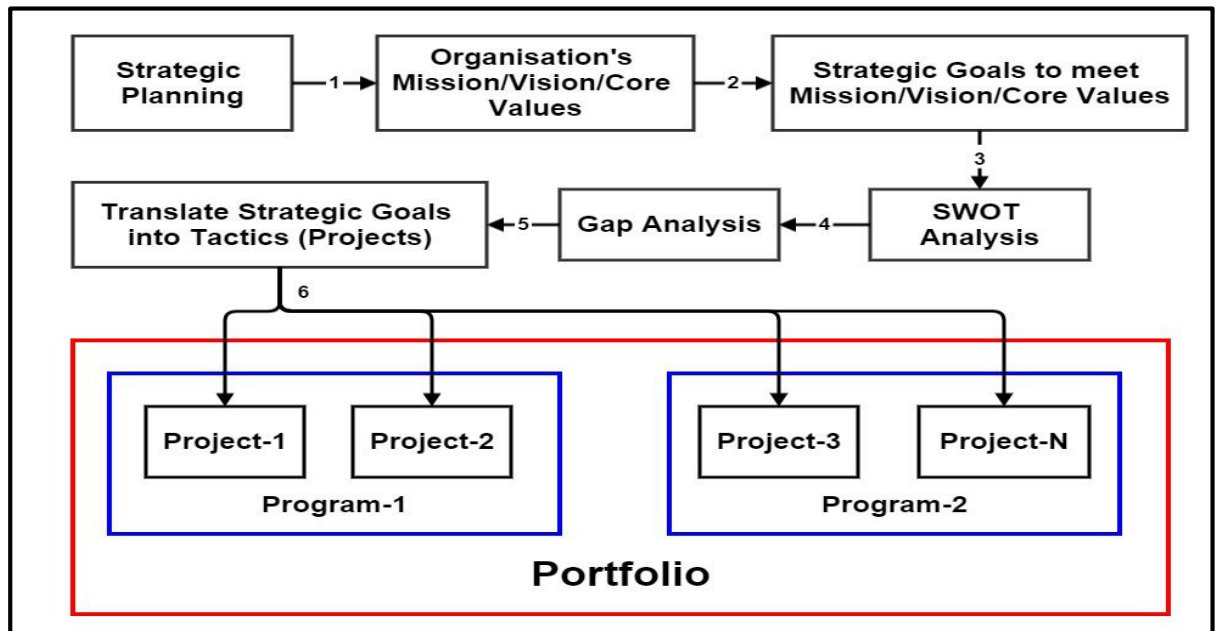
In his study of bid/no bid decisions in Saudi Arabia Bageis (2008) also explains that EPM is more concerned with the management of projects and programmes carried out by the organisation in order to achieve its goals. In this sense, the importance of selecting the

right proposed project to bid for becomes as vital as selecting the right project in the portfolio of an organisation. The decision whether to bid for a project or not should be aligned with the company strategy; as the strategy of the company is linked to its goals. Project selection in the construction companies business often appears in the form of bid/no bid decisions. If a contractor decided to bid for a project and then won the bid, the company will be obliged to fulfil the contractual obligations. Thereafter this project becomes one of the contractor's projects, which should be managed and aligned accordingly to the company strategy.

In order to assess the current situation of the organisation and to link it to project selection Morris and Jamieson (2004) point out that the process of the bid/no bid decision can benefit from the process of choosing the right project based on the portfolio of the company, since both involve strategic focus, feasibility studies, and the availability of resources. However, Bageis (2008) states that many frameworks related to linking strategy and portfolios for project selection fail to point out how to translate the strategies of an organisation into policies or a course of action, in order to comprehensively consider the current situation of an organisation and align that in the project selection decision process.

Bageis, also, recommends the framework of Al-Balushi *et al.*, (2004) which involves set of common measures in order to assess the current situation of an organisation for accurate project selection. These set of common measures, which can be seen in the following Figure 2.2, considers the strategic planning process, which starts by identifying the vision, the mission, and the core values of the construction organisation; describes why the organisation exists and what are its objectives to achieve. Strategic goals are then identified to meet the mission, vision and core values. This process will be examined with reference to the current situation of the organisation through SWOT analysis by identifying the Strength, Weaknesses, which are internal forces, and Opportunities and Threats, which are external forces. The next step is the analysis of the gap between the existing situations and where the organisation is heading to achieve its strategic goals. Finally, the strategic goals are translated into different projects that compose the various programmes and portfolios. In basic terms, organisations are portfolios of projects.

These set of common measures in Figure 2.2 can be used in shaping the direction of the bid/no bid decision. In this sense, the gap that this research is aiming to fulfil is to implement these measures into the bid/no bid decision. However, the aim is to benefit from these measures in order to develop a relative technique (web-based-decision model) to facilitate the bid/no bid decision-making process for the Saudi Arabian construction industry.



**Figure 2.2: Translation of Strategy into Projects and Programmes**

*Source: Adapted from Al-Balushi, Kaka and Fortune (2004), Project management processes and the achievement of organizational strategies - the case of a telecomm operator*

## 2.5. The Importance of the Bid/No Bid Decision

The next step after the pre-evaluation phase and selecting the most appropriate project is the tendering process. The tendering process involves two crucial decision. The first decision is known as the bid/no bid decision, which is associated with the determination of the appropriateness of the investment/project. The bid/no bid decision, which also known as the project selection decision, is one of the main strategic decisions that a contractor organisation makes towards an actual commitment for a potential project. The bid/no bid decision is both complex and dynamic, involving many factors, while the selection of the most appropriate projects for which to bid is fundamental to a successful

commercial strategy (Shash, 1993; Lowe and Parvar, 2004; Bageis, 2008; Shafahi and Haghani, 2014).

This decision occurs after or as a result of other strategic bidding processes, such as accepting an invitation to bid, buying the bid documents, and preparing the tender documents (Shash, 1993; Bageis, 2008). Furthermore, continuous and extensive evaluation of the project and risk identification before and after each step of the bidding processes is required, where this decision should be aligned to the organisation's strategy and its strategic goals (Moore, 2010).

The second decision in the tendering process is known as the mark-up size decision, which is a major input point for calculating bidding prices. It usually consists of general overhead, profit and contingency costs, which are expressed in percentages (Lee and Chang, 2004; Shafahi and Haghani, 2014). To understand the main difference between these two decisions, Shash (1993) explains, that the importance of the bid/no bid decision emerges from its financial consequences, as such a decision implies the incurring of substantial costs that may not be recovered immediately. However, this decision is based on both monetary and non-monetary criteria, to evaluate an opportunity, while the mark-up size decision is associated with uncertainties based on monetary factors, in order to determine the bidding price and mostly to investigate the expected return after accomplishing the investment/project.

Both bid/no bid and mark-up decisions are very important, as success or failure of a contractor's business lies in the outcome derived from those decisions. What evidence there is, however, suggests that this decision is usually determined by subjective rather than objective information (Fellows and Langford, 1980; Ahmad and Minkarah, 1988; Shash, 1998; Lowe and Parvar, 2004; Bageis and Fortune, 2009). In fact, Shafahi and Haghani (2014) point out that the mark-up decision, which concerns the bidding price, has been considered the only evaluation criterion in many of the previous studies, especially when the auction is held as a sealed bid price auction. In these types of auctions, the objective is to have the lowest bidding mark-up among all competitors. Most of the work done is in the mark-up selection area and only considers monetary criteria.

The interest in models concerning this subject, the mark-up size decision, began in 1956, when Friedman introduced his model of how to win a bid (Friedman, 1956). Subsequently, a model to aid the second mark-up decision, which appeared to enhance organisations' bidding success, was introduced by Gates (1967). According to Shafahi and Haghani both Friedman's model and Gates's model were initially introduced to calculate the probability of outbidding when there are more than two competitors for a project. However, they point out that "*since these models were first developed, there has been controversy between their supporters and critics*" (Shafahi and Haghani, 2014, p. 1483).

In fact, from 1956 onwards, the literature focused on developing solutions regarding the mark-up size decision based on monetary points of view, until other studies began to shed the light on the bid/no bid decision as an important decision affecting the success of both the projects/investments and the construction organisations themselves. These authors argued that non-monetary factors will directly affect the project success and they should be considered and evaluated effectively to avoid negative consequences occurring if organisations bid for inappropriate projects (Ahmad, 1990; Shash 1993; Lowe and Parvar, 2004; Bageis and Fortune, 2009; Jarkas *et al.*, 2014).

What evidence there is, however, suggests that this bidding decision is usually determined by subjective rather than objective information (Fellows and Langford, 1980; Bageis and Fortune, 2009). Thus, in the literature, attention was directed towards factors that could affect the bid/no bid decision, in order to achieve more rational decisions. According to Jarkas *et al.* (2014) this attention resulted in many different studies which were focused on bid/no bid decision ranking factors: for example, studies conducted by Ahmad and Minkarah (1988), Odusote and Fellows (1992), Shash (1993), and Wanous *et al.* (2000) identified and ranked in order of importance 31, 42, 55, and 38 factors, respectively, which are believed to influence the bid/no-bid decision.

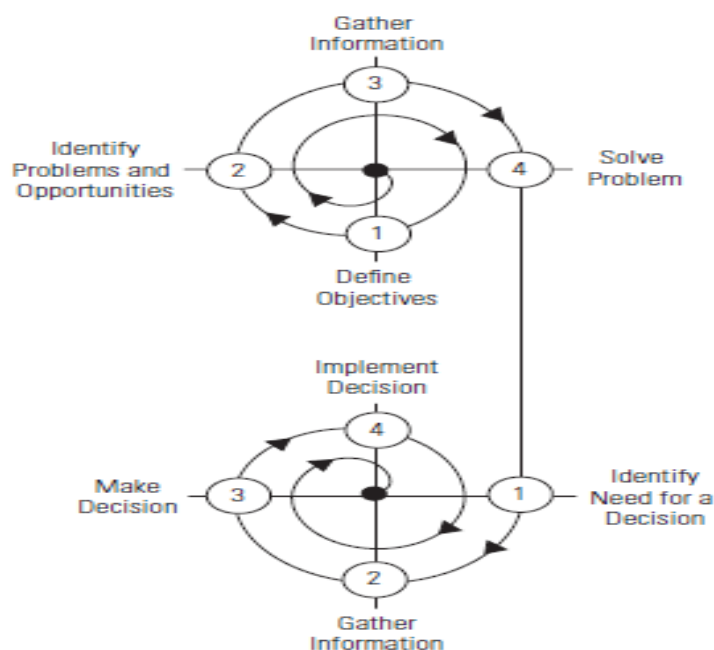
What is more, there has been a continuous development of bid/no bid decision models in the literature since Friedman's mark-up size model, with the introduction of many new bid/no bid decision models as well. For example, Carr and Sandahl (1978) introduced both mark-up and bid/no bid models, and Eastham (1987) divides the bid/no-bid decision into objective and subjective decisions, while Ahmad's (1990) was the first study that

introduced a bid/no bid decision model based on ranked critical factors, which were identified after investigating 400 US organisations about their behaviours towards the bidding decision.

Additionally, as Jarkas *et al.*, (2014) point out, to bid or not to bid for a particular construction projects is a crucial strategic decision for contractors' sustainability in the industry. To decide not to bid for a project could result in losing an opportunity to make a sizable profit, enhance strength and position in the industry, and develop a relationship with a client, which can open up further opportunities for the contractor to take. Conversely, deciding to bid for an inappropriate project may translate into a considerable loss, an adversarial relationship with the client, and possible arbitration or litigation; at best, it may translate into a substantial waste of valuable time and resources, which could be invested in a more profitable enterprise. The importance of this dilemma, and the high degree of complexity and uncertainty associated with such a decision-making process, reflecting of numerous internal and external determinants, therefore necessitates further exploration of the critical factors underpinning the decisions of contractors to bid or not to bid for construction projects.

## **2.6. Risk Management and Decision-Making**

According to Burke and Barron (2014, p. 337) there is a strong relationship between problem-solving and decision-making processes, as can be seen in Figure 2.3. Decision making is “*a companion process to problem solving, where problem solving is a process for analysing the problem and identifying a number of feasible and technical solutions*”, in which a problem can be classified into three categories: a certainty, a risk, or an uncertainty. Thus, decision making can be defined as “*a collaborative process involving selection from a range of options or possibilities to gain collective support and team commitment for the most suitable solution*”. They conclude that ultimately, a decision is “*a commitment to action that authorizes the consumption of finite project resources*”.



**Figure 2.3: Problem-Solving and Decision-Making Processes**

*Source: Adapted from Burke and Barron (2014), Project management leadership: building creative teams*

There is uncertainty in everyday life, and in organisations and projects (Olsson, 2007; Serpella *et al.*, 2014). This uncertainty could represent a clear threat to the business, but is also, in itself, a significant opportunity that must be taken (Hillson, 2010). However, there is a connection between uncertainty and risk, as Hillson (2003) indicates that risk is an uncertainty that can be measured, whereas uncertainty is a risk that cannot be measured. Generally, risk can be defined as “*a measure of the probability and consequence of not achieving a defined project goal*” (Kerzner, 2009, p. 743). Specifically for project risks, according to the Project Management Body Of Knowledge (PMBOK) Guide: “*project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality*” (PMBOK Guide, 2013, p. 310).

Further, Kerzner (2009) points out that evaluating risk is not always an easy task; since the probability of occurrence and the consequences of occurrence are usually not directly measurable parameters, and must be estimated by judgment, statistical, or other procedures. Also, risk has two primary components for a given event. The first is the probability of occurrence of that event, and the second is any impact or consequence of



the event occurring (amount at stake). In general, as either the probability or consequence increases, so does the risk, and both the probability and consequence must be considered in risk management.

Currently, risk management (RM) is considered as an integral part of project management (Olsson, 2007; Kerzner, 2009; Serpella *et al.*, 2014). According to Anderson (2009), one of the most difficult activities is determining what are the project's risks and how they should be prioritised; and for that reason risk management is an important part of project management. In general, applying risk management tools and techniques is a key process for success, and most decision makers acknowledge that risk management knowledge is essential for successful project management, and for more accurate and assertive decisions (Baloi and Price, 2003; Perera and Holsomback, 2005; Alali and Pinto, 2009; Serpella *et al.*, 2014).

Thus, risk management is defined as the process of identifying and assessing risks, and applying methods to reduce these to an acceptable extent. Thus, the main goal of risk management is to help organisations better manage risks associated with their missions and projects (Tohidi, 2011). In detail, the main purpose of risk management for projects is to identify, evaluate, and control the risk, to ensure the project's success (Lee *et al.*, 2009; Serpella *et al.*, 2014). According to the PMBOK Guide: "*the objectives of project risk management are to increase the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project*" PMBOK Guide (2013, p. 309). To achieve this aim, project risk management includes the following six processes (*ibid*):

- 1) **Plan Risk Management:** as the process of defining how to conduct risk management activities for a project;
- 2) **Identify Risks:** as the process of determining which risks may affect the project and documenting their characteristics;
- 3) **Perform Qualitative Risk Analysis:** as the process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact;
- 4) **Perform Quantitative Risk Analysis:** as the process of numerically analysing the effect of identified risks on overall project objectives;

- 5) **Plan Risk Responses:** as the process of developing options and actions to enhance opportunities and to reduce threats to project objectives; and
- 6) **Control Risks:** as the process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project.

Harris (2009) points out that the first two processes are about understanding the scope of the project and the likely sources of risk, which start out as uncertainties at the pre-decision stage, while the following analysis can assist by providing a basis for discussion about the possible sources of risk. However, “*project risk appraisal should begin before the organisation makes its decision about whether to undertake a project or if faced with several options, which alternative to choose*” (*ibid*, p. 7), as organisations need to set the scene for pre-decision project risk assessment, when there is more uncertainty than measurable risk to be considered. This point of view is widely accepted and has received wide support in the literature since the emergence of the risk management maturity model in 1997 (Chapman, 2011; Hopkinson, 2011; Wieczorek-Kosmala, 2014).

## **2.7. Risk Maturity Model (RMM)**

Maturity models provide a systematic framework to carry out a continuous comparative evaluation of the organisation and its activities (Demir and Kocabas, 2010), and can strategically lead the organisation to continuous improvement, which requires a deep understanding of the current position of an ambitious organisation and where it aspires to be in the future (Brookes and Clark, 2009; Serpella *et al.*, 2014). A risk maturity model (RMM) is a strategic tool designed to assess the risk management capability of an organisation. Risk management maturity models are constructed based on an evolutionary nature, where they consist of a number of levels in which the complexity level is increased from one to another in the quest for perfection (Serna, 2012; Wieczorek-Kosmala, 2014). Thus, RMM helps decision-makers to implement a top-down multi-pass approach to project risk management, which supports the critical feature of risk analysis, which is identifying the right questions and understanding the fundamental purposes of these questions (Hopkinson, 2011).

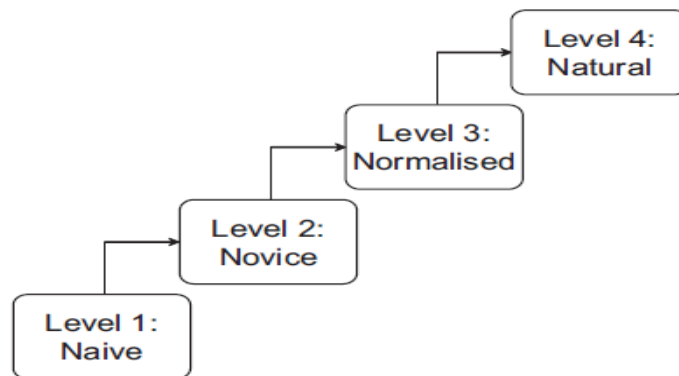
Project RMM was first developed by HVR Consulting Services in 1999, with four levels of capability, which are derived directly from the structure developed by David Hillson (1997), who used it to establish a generic Risk Maturity Model framework. Since then, many risk management maturity models have been introduced and developed in the literature (Hopkinson, 2011). In the area of project management, research indicates that organisations applying risk maturity model gain benefits in terms of continuous improvement of their project management maturity level, more experience in cost savings techniques, increased schedule predictability, and quality improvement (Korbel and Benedict, 2007).

Hillson's model is widely implemented nowadays by both financial and non-financial organisations, where the prime reason for this trend are the rapid dynamics and constant hardening of the business environment. In overcoming such obstacles, such a strategic tool provides a benchmarking approach towards effective implementation of risk management processes; thus, well-designed and successfully implemented risk management processes can provide organisations with a comparative advantage over those that do not manage risk (Wieczorek-Kosmala, 2014).

Hillson's benchmarking levels of capability for the risk maturity model (RMM), which are shown in the following figure (Figure 2.4), are described as follows (Hillson, 1997):

- 1) **Level 1: The Naive risk organisation:** which is unaware of the need for management of risk, and has no structured approach to dealing with uncertainty. Management processes are repetitive and reactive, with little or no attempt to learn from the past or to prepare for future threats or uncertainties;
- 2) **Level 2: The Novice risk organisation:** which is experimenting with application of risk management, usually through a small number of nominated individuals, but has no formal or structure generic processes in place. Although aware of the potential benefits of managing risk, the organisation has not effectively implemented risk processes and is not gaining the full benefits;
- 3) **Level 3: The Normalised risk organisation:** which has built management of risk into routine business processes and implements risk management on all projects. Generic risk processes are formalised and widespread, and the benefits are understood at all levels of the organisation, although they may not be consistently achieved in all cases; and

- 4) **Level 4: The Natural risk organisation:** which has a risk-aware culture, with a proactive approach to risk management in all aspects of the business. Risk information is actively used to improve business processes and gain competitive advantage. Risk processes are used to manage opportunities as well as potential negative impacts.



**Figure 2.4: The Four Levels of Risk Maturity Model (RMM)**

*Source: Adapted from Hillson (1997), Towards a Risk Maturity Model*

## **2.8. Risk Factors Affecting Bid/No Bid Decisions in the Construction Industry**

The factors affecting bid/no bid decisions are classified into three categories based on the gap that this research aspires to fulfil. These categories are as follows: construction projects' risk factors, public-private partnership risk factors, and international investment risk factors.

Bid/no bid decisions as models for contractor organisations have been investigated in previous studies. In particular, the most discussed models in literature are seven models that have been developed to help contractors choose the right bidding decision for construction projects, and these are as follows:

- Worth assessment technique (Ahmad, 1990);
- Analytical hierarchal process (Abdelrazig, 1995);
- NeuroFuzzy expert system (Wanous, 2000a);

- Parametric solution (Wanous *et al.*, 2000b);
- Artificial neural network (Wanous *et al.*, 2003);
- Logical regression and reasoning techniques (Lowe and Parvar, 2004); and
- Bid/no bid decision model (Bageis, 2008).

After studying the previous decision models that considered the bid/no bid decision, gaps and drawbacks have been found in relation to international investment and public private partnership projects, in addition to the gap in linking such a vital decision with the organisation's strategy, policies, and current situation. Thus, an opportunity exists for this research to contribute to filling these gaps. In particular, Ofori (2003), Lowe (2007), Cheng *et al.* (2011), and Osei-Kyei and Chan (2015) highlight that there are no existing models that are specifically applicable to international construction; especially for PPP projects in developing countries. Therefore, the researcher believes that there is a strong need for a strategic bid/no bid decision model for international investment dedicated to public private partnership projects from the perspective of risk management, and that such a tool would help both international organisations and countries engaging in PPP projects to achieve success. It is the intention of the researcher to develop such a model, hence, the relevant factors or model's inputs should be identified first.

### **2.8.1. Construction Projects' Strategic Risk Factors in Bid/No Bid Decisions**

The drive to maintain competitiveness in the construction industry has been an ever present goal within the global market. Therefore, since the time of Friedman (1956), a number of previous investigations have focused on bidding strategies and bidding models in order to enhance the accuracy of the bidding decisions, and to establish effective methods by which these bidding decisions can be modelled in seeking successful investment decisions (Bageis and Fortune, 2009; Sullivan, 2011; Shafahi and Haghani, 2014; Jarkas *et al.*, 2014). Previous studies have identified bid/no bid factors for different construction industries. Most of these studies relied on the identification of the factors investigated in the study by Ahmad and Minkarah in 1988. It is found that each study identified factors that were associated with the area of the construction industry under investigation, with different levels of importance assigned to each factor, and some identified factors which are not mentioned in other studies (Bageis, 2008; Jarkas *et al.*, 2014).

In particular, Oo *et al.*, (2007) and Jarkas *et al.*, (2014) point out that even though the principal factors influencing bid/no bid decisions for construction projects may be comparable across the globe, several factors related to a local industry, socio-economic, environmental and cultural issues further contribute to such decisions, introducing a high level of heterogeneity across contractors in terms of their intrinsic bid/no bid preferences, and responses to decision to bid factors.

Thus, bearing in mind the nature of Saudi Arabia construction industry, the immature implementation of PPP in Saudi Arabia construction industry, and the need of the majority of local contractors to develop their adoption of project management tools and techniques, which discussed in Sections 1.2 and 1.3, this necessitates a revision of the identification of risk factors that could affect bid/no bid decisions in Saudi Arabia construction industry. What is more, this revision will provide an opportunity for this research to re-examine and identify these factors and establish an index of their importance with respect to the bidding environment in Saudi Arabia. And then, to adopt these factors in the thesis output for a strategic risk management bid/no bid decision model for international PPP projects in the Saudi Arabian construction industry.

However, most of the previous studies have mentioned the importance of conducting exploratory studies by using qualitative interviews in order to explore the potential factors associated with the industry under investigation, followed by a quantitative survey in order to rank their level of importance (Wanous *et al.*, 1998; Chua and Li, 2000; Wanous, *et al.*, 2000; Wanous *et al.*, 2003; Lowe and Parvar, 2004; Egemen and Mohamed, 2007; Bageis and Fortune, 2009; Jarkas *et al.*, 2014). A comprehensive review of the literature interested in bidding decisions resulted in identifying 112 potential factors that could affect contractors bid/no bid decisions. Fundamentally, these factors were generated from the outcomes of the following investigations studies: Ahmad and Minkarah (1988), Abdul-Hadi (1990) Shash (1993), Wanous *et al.*, (2000), Chua and Li (2000), Lowe and Parvar (2004) and Bageis (2008). The results of these previous studies, which can be seen in Table 2.1, can be distinguished in terms of the number of the identified factors, the factors' weights of importance, and the country that each study covered. Also, the identified factors were categorised differently in each study. Some studies categorised them as internal and external factors or as positive and negative factors, whereas other studies categorised them in groups consist of correlated factors.

**Table 2.1: Construction Projects' Risk Factors for Bid/No Bid Decisions identified from the literature review**

Construction Projects' Risk Factors for Bid/No Bid Decisions identified from the literature review								
No	Factor Description	Ahmad and Minkarah (1988) USA	Abdul-Hadi (1990) SA	Shash (1993) UK	Wanous <i>et al.</i> (2000) Syria	Chua and Li (2000) Singapore	Low and Parvar (2004) UK	Bageis (2008) SA
1	Size of project	√	√	√	√	√	√	
2	Duration of the project	√	√	√	√	√		√
3	Location of the project	√	√	√	√		√	√
4	Project cash flow	√	√	√	√	√		√
5	The organisation's current workload	√	√	√	√	√		√
6	Past experience with similar projects		√	√	√	√	√	√
7	Risk involved in investment	√	√	√	√		√	
8	Risks expected fluctuation in labour, material, etc.	√	√	√	√	√		
9	Type of equipment required	√	√		√	√	√	
10	Type of labour required	√		√	√	√	√	√
11	Type/nature of the project	√		√		√	√	√
12	Project start time	√	√	√		√		
13	Owner (Private, Public)	√	√	√		√		√
14	Availability of required cash		√	√		√	√	√
15	Availability of qualified human resources		√	√		√	√	
16	Cost accuracy estimated by the contractor	√	√	√	√	√		√
17	General office overhead	√	√	√		√		√
18	The organisation's financial situation	√	√	√		√		√
19	Required performance security (bond & guarantee)		√	√		√	√	√
20	Classification degree required to enter the bid		√	√	√	√		√
21	Availability of equipment and materials		√	√	√		√	
22	Quality of available labour		√	√	√	√		
23	The expected chance of winning the bid	√	√	√	√			
24	The ability? of portion subcontracted to others	√	√	√	√			
25	Safety hazards	√		√		√		
26	The client's reputation				√	√	√	√
27	Contract conditions			√	√		√	√
28	Work-capital availability to start the project	√			√		√	√
29	Availability of required equipment				√	√	√	

No	Factor Description	Ahmad and Minkarah (1988) USA	Abdul-Hadi (1990) SA	Shash (1993) UK	Wanous <i>et al.</i> (2000) Syria	Chua and Li (2000) Singapore	Low and Parvar (2004) UK	Bageis (2008) SA
30	Bidding methods			√		√	√	
31	The expected competitors			√	√	√		√
32	Design quality	√	√	√				
33	Commitment of partners		√	√		√		
34	Type of contract		√	√			√	√
35	Need for a new project	√	√	√				√
36	Reliability level of subcontractors	√	√	√		√		
37	Past profit in similar project		√	√	√			
38	Time remaining to submit the bid		√		√	√		√
39	The condition of labour availability		√	√			√	√
40	Governmental division requirements		√	√		√		√
41	Availability of other projects		√	√	√	√		√
42	Confidence in work force	√	√	√				
43	Site clearance of obstruction			√	√	√		
44	Completeness of project's design			√		√		√
45	Degree of difficulties	√		√				
46	Prompt payment habit of the client					√	√	√
47	The client's financial capacity				√		√	√
48	Tax liability	√		√				
49	Degree of difficulties in obtaining bank loan					√	√	√
50	Availability of qualified sub-contractors					√	√	
51	Rate of return	√		√				√
52	Contingency	√		√				
53	Labour environment	√		√				
54	The project supervision procedure	√		√				√
55	Time of bidding (season)	√	√					√
56	The client requirements		√	√				
57	Design team available		√	√				
58	Historic profile	√						
59	The benefits expected in terms of general relationship		√					√
60	Bidding document price		√					√
61	Tendering duration			√				



No	Factor Description	Ahmad and Minkarah (1988) USA	Abdul-Hadi (1990) SA	Shash (1993) UK	Wanous <i>et al.</i> (2000) Syria	Chua and Li (2000) Singapore	Low and Parvar (2004) UK	Bageis (2008) SA
62	Scope of work required to enter the bid			√				√
63	Contractor involvement in the design phase			√				
64	Policy in prediction of cost saving			√				
65	Policy in economic use of building resources			√				
66	Percentage of insurance premium			√				
67	Anticipated value of liquidated damage			√				
68	Method of construction				√			
69	Specific features that provide competitive advantage				√			
70	Relation to other contractors and supplier (supply chain)				√			
71	Accuracy of the original cost estimated by the client				√			√
72	Local customs				√			
73	Expected date of commencing				√			
74	Community outreach				√			
75	The prevailing climatic/geographical conditions				√			
76	Degree of buildability				√			
77	Site accessibility				√			
78	Adequacy of resource market price information					√		
79	Possession of qualified staff					√		
80	Possession of qualified labour					√		
81	Possession of qualified subcontractor					√		
82	Possession of qualified equipment					√		
83	Organisation's ability in required construction technique					√		
84	Degree of subcontracting					√		
85	Consultants' interpretation of the specification					√		√
86	Market share					√		
87	Familiarity with site condition					√		
88	Organisation's ability in design and innovation					√		
89	Past experience in managing similar project					√		
90	Fines for delay					√		
91	Benefits expected in terms of the organisation's reputation					√		
92	Need for continuity in employment of key personal and work force					√		
93	Degree of technological difficulties					√		

No	Factor Description	Ahmad and Minkarah (1988) USA	Abdul-Hadi (1990) SA	Shash (1993) UK	Wanous <i>et al.</i> (2000) Syria	Chua and Li (2000) Singapore	Low and Parvar (2004) UK	Bageis (2008) SA
94	Economic contribution of the project						√	
95	Ability to execute the project						√	√
96	The project is matching the organisation strategy and future vision						√	
97	Financial goals of the organisation						√	
98	Degree of possible alternative design to reduce the project cost						√	√
99	Recourses to tender for the project						√	
100	Lowest cost bidding						√	
101	Previous experience with the client							√
102	The benefits expected in terms of the equipment and assets of the organisation							√
103	The possibility of additional work (extra time)							√
104	Sufficiency of project's information							√
105	The project management system							√
106	The organisation's current projects' performance							√
107	The advance payment							√
108	The accuracy of bill of quantity provided by the client							√
109	Benefits expected in terms of renewal stage of classification certificate							√
110	Clarity of the work and specifications							√
111	Can the client provide a financial guarantee							√
112	Use of nominated sub-contractor							√

### **2.8.2. Public-Private Partnership Critical Success Factors (PPP-CSFs)**

Public-private partnership (PPP) was first introduced in the UK in 1992, in the form of private finance initiative (PFI), as a way of procuring public infrastructures by which private sector organisations will finance, build and, operate infrastructure projects under contracts that typically will last between 25 to 30 years (Cheung *et al.*, 2012). After the global financial crises in 2007-2008, there has been an increasing interest in the adoption of public-private partnership (PPP) policy by governments in both developed and developing countries as a scheme to deliver construction projects. Many governments across the globe are now seeking to utilize the private sector's expertise and capital to minimize their infrastructure deficit (Chan *et al.*, 2010; Cheung *et al.*, 2012; Osei-Kyei and Chan, 2015).

Given the growing interest in PPP projects since the late 1990s (Li *et al.*, 2005), different areas of PPP have been explored and investigated; areas such as risk management (Akintoye *et al.*, 1998; Shen *et al.*, 2006), relationship management (Abdul-Aziz, 2001; Chan *et al.*, 2003; Smyth and Eddins, 2007), financial viability (Bakatjan *et al.*, 2003; Wibowo, 2004) and procurement (Ng *et al.*, 2007; Ye and Tiong, 2003) have all been extensively explored by researchers worldwide.

Public-private partnership (PPP) has been defined in several ways by researchers and practitioners, with each definition varying slightly from the others (Abadie and Howcroft, 2004; Cuttaree and Mandri-Perrott, 2011). According to Mota and Moreira (2015), the concept of PPP is 'not consensual'; as there are multiple schemes/models that change from a country to another, applied to different sectors of activity, which undoubtedly creates a difficulty in establishing a univocal, unchallenged definition of PPP.

However, while it is difficult to provide a definite definition of a PPP, there are common characteristics of PPP in literature. Firstly, there is always some form of cooperation between the public sector and the private sector, which is designed to explore synergies, resources and know-how in a bid to attain common goals, which could not be achieved without the collaboration of the other entity. And secondly, a contractual relationship exists where risk is shared and clearly apportioned to the entities of both parties, which are established with a long-term view (Maskin and Tirole, 2008; Dunn-Cavelty and Suter, 2009; Tang *et al.*, 2010; Shaoul *et al.*, 2012; Mota and Moreira, 2015).

Through PPP schemes, the private sector's skill and management expertise is employed in delivering public infrastructure projects under long-term agreements (Skietrys *et al.*, 2008). Further, according to Akintoye *et al.* (2003) and Osei-Kyei and Chan (2015), this method of procurement routes provides an effective way of delivering high value for investments into public infrastructure procurement as well as combining the advantages of competitive tendering, flexible negotiations, and risk allocation between parties (Akintoye *et al.*, 2003; Ke *et al.*, 2010a, 2010b; Hwang *et al.*, 2013). Thus, by adopting PPP schemes, governments can focus on other sectors of their economy to foster infrastructure growth and development (Cumming, 2007; Osei-Kyei and Chan, 2015).

By 2012, 139 developing countries had invited private entities to participate in PPP policies (Chou *et al.*, 2012) in order to accelerate infrastructure development. Such countries have applied PPPs to take advantages such as improving the operational efficiency, enabling innovation in technological and managerial skills, and increasing the involvement of private entities in public services (Chowdhury *et al.*, 2011; Hwang *et al.*, 2013; Chou and Pramudawardhani, 2015).

A key significant characteristic of PPP is the allocation and sharing of risk among parties (Ke *et al.*, 2010a, 2010b; Chou and Pramudawardhani, 2015; Osei-Kyei and Chan, 2015). Unlike other procurement methods, with a PPP arrangement, risks are carefully identified and allocated to the party that has better mitigation techniques for such risks (Li *et al.*, 2005a). Additionally PPP is noted for its long term partnership, with over 10 years of relationship between the public entity and private consortium, therefore a stable and enduring relationship is often required for its effective operation (Osei-Kyei and Chan, 2015). Furthermore, in this scheme, each partner will complement and enhance the relationship, and brings in some resources, which could be material or immaterial, to the partnership (Akintoye *et al.*, 2003; Chou and Pramudawardhani, 2015).

Osei-Kyei and Chan (2015) point out that following the evolution of PPP in the early 20th century, a spectrum of differing PPP models has been widely implemented including the popular concession structure, Build Operate Transfer (BOT). Other forms of PPP models include Design Build Finance Operate (DBFO), Build Transfer Operate (BTO), Design Build Operate Maintain (DBOM), Build Own Operate Transfer (BOOT), Operate and Maintain (O&M), Design and Build (DB), Build Lease and Transfer (BLT), Design

Construct Manage and Finance (DCMF), Design Construct Manage and Finance (DCMF) and several other similar concession acronyms.

These models have been widely implemented in different economic sectors, especially in the developed countries. For instance, the Design Build Finance Operate structure, which is a form of the U.K.'s PFI model, is the model mostly adopted for construction projects (Kwak *et al.*, 2009). However, it is worth noting that the adoption of PPP models varies among countries worldwide and very often the choice depends on the country's objectives and the purpose of the PPP policy implementation (Abdel Aziz, 2007; Osei-Kyei and Chan, 2015).

In spite of the huge interest by governments worldwide in PPPs, its implementation is still experiencing many impediments which need critical attention. Obstacles encountered with PPP implementation include high cost of transaction, lengthy procurement process, lack of appropriate skills, unattractive financial market, incomplete risk transfer and higher end user charges (Grimsey and Lewis, 2007; Li *et al.*, 2005a; Liu and Wilkinson, 2011; Osei-Kyei and Chan, 2015). These obstacles to PPP practices and implementation add to the importance of conducting a comprehensive review of studies on critical success factors for PPPs, to explore the most critical success factors likely to affect successful PPP implementation in Saudi Arabia.

For the past decades, researchers worldwide have been keen to discover the key ingredients for delivering successful PPP projects, where a major area of PPP studies that has received much attention from researchers is identifying the PPP critical success factors (CSFs) (Cheung *et al.*, 2012; Chou and Pramudawardhani, 2015; Osei-Kyei and Chan, 2015). According to Rockart (1982), the CSFs can be defined as the few key areas of activity where favourable results are absolutely necessary for a manager to reach his/her goals. The CSF model has been employed for management measures since the 1970s (Mohr and Spekman, 1994). This approach actually opens up the major areas necessary for ensuring success in management (Boynton and Zmud, 1984). The high level of attention directed towards CSFs was revealed in four reviews of the PPP research trend: from 1995 to 2006, by Jacobson and Choi (2008); from 1998 to 2008, by Ke *et al.* (2009); from 1997 to 2006 by Chan *et al.* (2010), and from 1990 to 2013 by Osei-Kyei and Chan (2015).

It is evident that researchers worldwide are interested in exploring the best ways of delivering PPP projects. Undoubtedly, this area of PPP investigations will continue to be of great interest to researchers in future, as the PPP market keeps growing and maturing in other authorities and sectors (Chan *et al.*, 2010; Tang *et al.*, 2010; Osei-Kyei and Chan, 2015). However, despite the increasing interest in the success factors for PPP projects, in the literature little attention has been given to the need for review and analysis of the factors that have already been identified in previous studies. In particular, with respect to the existing construction boom in Saudi Arabia, The present review in this section will try to fill this gap. Particularly examining the applicability and importance levels of these CSFs to local and international contractors would intend to invest in the Saudi construction industry under PPP schemes.

Since the evolution of PPP, a number of researchers have employed the concept of CSFs to enhance the understanding and best ways of implementing PPP policy for infrastructure development (Liu *et al.*, 2014; Osei-Kyei and Chan, 2015). This concept has been employed in diverse areas of PPP arrangement, ranging from different infrastructure sectors, project models, and stages within the PPP arrangement. Hence, the present review of the literature interested in the PPP CSFs has found 60 factors, which fundamentally belong to the following investigations: Larson (1995), Qiao *et al.* (2001), Nijkamp *et al.* (2002), Glagola and Sheedy (2002), Chan *et al.* (2004), Zhang (2005), Li *et al.* (2005b), Tang *et al.* (2006), Trafford and Proctor (2006), Leiringer (2006), and Jacobson and Choi (2008). These factors are presented in the following table (Table 2.2).

**Table 2.2: Public-Private Partnership Critical Success Factors identified from the literature review**

Public-Private Partnership Critical Success Factors identified from the literature review												
No	Factor Description	Larson (1995)	Qiao <i>et al.</i> (2001)	Nijkamp <i>et al.</i> (2002)	Glagola and Sheedy (2002)	Chan <i>et al.</i> (2004)	Zhang (2005)	Li <i>et al.</i> (2005b)	Tang <i>et al.</i> (2006)	Trafford and Proctor (2006)	Leiringer (2006)	Jacobson and Choi (2008)
1	Pre-project team-building	√							√			
2	A joint project charter	√										
3	Regular Monitoring of Partnering Process	√				√						
4	Establishment of Conflict Resolution Strategy	√			√	√			√			
5	Shared goal review	√										
6	Process improvement	√				√						
7	Risk sharing strategies (contractual arrangements)	√					√					
8	Appropriate project identification		√									
9	Stable political and economic situation		√					√				
10	Sound financial package		√				√					
11	Acceptable toll/tariff levels		√									
12	Appropriate risk allocation and risk sharing		√				√	√			√	
13	Selection and involvement of suitable subcontractors		√			√						
14	Management control		√									
15	Technology transfer		√									
16	Clear understanding of risks (Awareness)			√								√
17	Clear roles and responsibilities			√	√	√		√				√
18	Unifying specific vision			√	√							√
19	Adequate resources to deal with unexpected problems			√								
20	An entrepreneurial city viewpoint to advance urban revitalization			√								
21	Sharing common goals				√				√			
22	Mutual Trust				√	√			√			√

No	Factor Description	Larson (1995)	Qiao et al. (2001)	Nijkamp et al. (2002)	Glagola and Sheedy (2002)	Chan et al. (2004)	Zhang (2005)	Li et al. (2005b)	Tang et al. (2006)	Trafford and Proctor (2006)	Leiringer (2006)	Jacobson and Choi (2008)
23	Long-Term Commitment				√	√		√	√		√	√
24	Effective communication				√				√	√		√
25	Respecting goals of other partner				√							√
26	Willingness to Share Resources among Project Participants				√	√						
27	Expectation of excellence				√							
28	Reasonable relaxation of contract requirements				√							
29	Early Implementation of Partnering Process					√						
30	Innovative Capability					√						
31	Favourable investment environment						√					
32	Economic viability						√					
33	Reliable concessionaire consortium with strong technical strength						√	√				
34	Competitive procurement process							√				
35	Thorough and realistic cost/benefit assessment							√				
36	Project technical feasibility							√				
37	Transparency in the procurement process							√				
38	Good governance							√				
39	Favourable legal framework							√				
40	Available financial market							√				
41	Political support							√				√
42	Multi-benefit objectives							√				
43	Government involvement by providing guarantees							√				
44	Sound economic policy							√				
45	Well-organized public agency							√				
46	Shared authority between public and private sectors							√				
47	Social support							√				
48	Equity								√			
49	Attitude					√			√			



No	Factor Description	Larson (1995)	Qiao <i>et al.</i> (2001)	Nijkamp <i>et al.</i> (2002)	Glagola and Sheedy (2002)	Chan <i>et al.</i> (2004)	Zhang (2005)	Li <i>et al.</i> (2005b)	Tang <i>et al.</i> (2006)	Trafford and Proctor (2006)	Leiringer (2006)	Jacobson and Choi (2008)
50	Openness								√	√		
51	Timely responsiveness								√			
52	Incentives								√			
53	Effective Planning									√		
54	Ethos									√		
55	Direction									√		
56	Encourage collaborative working										√	
57	Design Freedom										√	
58	Willingness to compromise/collaborate											√
59	Community outreach											√
60	Expert advice and review											√

### **2.8.3. International Construction Critical Success Factors (IC-CSFs)**

The construction sector plays a key role in economic development and growth in developing countries (Giang and Pheng, 2011). As Zhang (2011) points out, the effects of globalization and the rapid urbanization in developing countries, due to the increased demand on knowledge, expertise and technology from more developed countries, have led to an expansion of international construction markets. However, although globalization has created opportunities for contractors' organisations to expand into the international construction market, bidding decisions for international construction projects are becoming difficult; due to the uncertainties and complexities accompanying such a special environment (Chen *et al.*, 2015). In particular, international construction is fraught with higher uncertainties and risks than in a domestic market (Han and Diekmann, 2001a, 2001b; Han *et al.*, 2005; Low *et al.*, 2015).

The decision of a contractor organisation to enter international construction markets is based on internal and external motivations, where the internal motives are those that focus mainly on opportunities in order to gain profit, while the external motives are necessary for the organisation's survival (Maqsoom *et al.*, 2014). Moreover, it is worth noting that literature has identified additional motives for contractor organisations which seek to participate in construction projects overseas, such as exploiting the abundant market opportunities available in foreign markets, benefitting from the resources present in the foreign markets, avoiding downturns of domestic markets, seeking higher rankings, diversifying the risks, getting international experience, and expanding the business networks (Freeman *et al.*, 2006; Wiersema and Bowen, 2008; Maqsoom *et al.*, 2014).

In order for contractors to internationalize, there are concerns as which countries to choose, how to enter into these countries or markets and the kinds of regulations and aspects of the business environment that need to be evaluated before entering into the identified markets of their choice, where the home government's support is a key factor which aids the international expansion of domestic firms. Thus, the main task prior to entering a new market is to obtain information in a structured manner, in order to determine the factors affecting the industry in the selected market, which in turn makes it possible to assess the chances of success (Lowe, 2007; Maqsoom *et al.*, 2014).

In relation to this subject, Harris (2009) points out that the strategic analysis of the organisational and environmental context for the project can help to generate several possible risks need to be considered in risk identification, which is one of the project risk management processes. Firstly, the analysis of strengths, weaknesses, opportunities and threats (SWOT) is a technique that can identify risk areas for the organisation from internal and external perspectives, and help to analyse the strategic fit of the project. Secondly, a more detailed analysis of the external factors, political, economic, social, technical, legal and environmental (PESTLE) can identify further risk areas that could impact on the project.

Consequently, in the light of the many challenges that surround the global economic environment, research and development (R & D) activities have been put forward as a significant influence in order to enable construction organisations to address these challenges and to become more competitive. There is a need to improve the scope of performance management, with the aim of transferring or sharing the best practice in construction projects throughout the construction sector (Kagioglou *et al.*, 2001; Bassioni *et al.*, 2005; Kulatunga *et al.*, 2009; Tang *et al.*, 2012).

Furthermore, Osei-Kyei and Chan (2015) point out that many publications have focused on exploring practices for a successful PPP implementation, whereas it is the international best practices for PPP that are essential, especially for international private developers and governments planning to employ the PPP concept in delivering public infrastructure.. In fact the high number of publications on international PPP practices over the past 23 years reveals the gradual shift of interest from exploring country specific PPP CSFs to international best PPP practices, which motivate organisations to invest internationally under a sensitive policy like PPP.

Yong and Mustaffa (2013) note that the study of project success and critical success factors (CSFs) can be found in literature in a chronological sequence, as it is one of the essential ways to understand the core challenges to a particular industry at a particular time. It is also a way to improve the effectiveness of project delivery (Chan *et al.*, 2004). Toor and Ogunlana (2008) note that, since Rubin and Seeling first introduced the concept of project success factors in 1967, and then Rockart (1982) used the terminology critical success factors (CSFs) for the first time, the last two decades have observed a

considerable increase in the studies interested in exploring the factors that are really critical to a construction project's success. For example, some of the most cited works in the literature include those by Ashley *et al.* (1987), Pinto and Selvin (1988), Savindo *et al.* (1992), Chan and Kumaraswamy (1996), Tiong (1996), Songer and Molenaar (1997), Chan *et al.* (2001), Jefferies *et al.* (2002), Nicolini (2002), Cooke-Davies (2002), and Nguyen *et al.* (2004), Andersen *et al.* (2006), Toor and Ogunlana (2008), Toor and Ogunlana (2009), Tang *et al.* (2012), and Yong and Mustaffa (2013).

However, Takim *et al.* (2004) argues that one of the difficulties in managing a construction project, especially in the government sector, is the failure in determining relevant CSFs across project phases. Similarly, Toor and Ogunlana (2008, p. 420) state that *“despite the fairly large volume of studies on the subject, there seems little agreement on CSFs and researchers continue to [stress] on more work in the area. Due to their distinctive interests in the project, it is also likely that different stakeholders have different perceptions about success factors. Due to the variable nature and discrete objectives of every other construction project, success factors are likely to be different”*.

Further, Toor and Ogunlana (2009) point out that, even though CSFs have been previously explored extensively outside the original country domain, most of those studies were context specific, as their implementations and implications are limited to the host countries where they were conducted. Another point of view critical of the previous CSFs researches' findings is that of Yong and Mustaffa, (2013, p. 960), who state: *“there has been little effort to contextualize the findings into a local context where the structure, culture and maturity of the concerned organizations are different. Moreover, many assumptions were made based on anecdotal evidence and hearsay without concrete empirical support from established research methodology”*.

In fact, with regard to the Saudi context, there are no previous studies focused on the following: 1- critical success factors for PPP projects in the Saudi Arabian construction industry, 2- critical success factors for international investors in PPP projects who accomplished projects successfully in the Saudi Arabia, and 3- the current PPPs boom with considerations to the weak performance of local contractors' organisations and the immature PPP environment in the Saudi construction industry.

Nevertheless, there are still numerous calls for knowledge regarding the crucial international construction critical success factors (CSFs) that enable organisations to be successful in delivering overseas construction projects. From a risk management perspective, CSFs are risk factors that can affect an international construction project's success, either positively or negatively, and need to be considered and dealt with effectively throughout the project risk management processes. Many studies emphasise that the identification of significant and influential CSFs is needed for the success of international construction projects, including Zhi (1995), Langford and Rowland (1995), Pietroforte (1996), Wang *et al.* (1999), Chatterjee (2000), Han and Diekmann (2001a; 2001b), Howes and Tah (2003), Ling and Hoi (2006), Lowe (2007), Kulatunga *et al.*, (2009); Tang *et al.*, (2012), and Yong and Mustafa (2013).

In exploring the relation between considering these factors and the successful investment decision Zhi (1995, p. 231) observes that overseas construction projects are usually considered as a '*high risk business.*' This is due to the lack of adequate overseas environmental information and overseas construction experience, where similar construction projects may have totally different risk characteristics in different regions.

Also, Zhi (1995, p. 231) states that "*it is difficult for a newcomer to identify new risks in a new environment. It is more difficult to assess these risks and the subtle impact of relationships among them. On the one hand, ignoring these risks is irresponsible, and unrealistic decisions will result*". On the other hand, he acknowledges that identifying and assessing all the new risks and their relationships is a very complicated, time-consuming, and expensive process. This process tends to be difficult for the majority of projects, especially where there are inadequate amounts of information and restricted bidding time. When such a complex scenario is faced, identifying and by then controlling these critical risk factors in overseas projects becomes extremely important for accurate and concrete investment decisions.

In addition to the internal risk factors that exist in any construction project, international construction projects are prone to external and unique risk factors that affect and influence decision-makers considerations. International construction projects have more uncertainties, especially in terms of external risk factors, mostly derived from the large-size of projects and from the international issues involved. Moreover, every construction

activity in international construction projects, particularly large-size projects, attracts risk in some respect. Thus, risk management then becomes more complicated and crucial for international construction projects' success: "*In particular, in a situation such as the pre-contracting stage, in which there are numerous uncertainties that should be considered but there is not currently enough detailed information available, identifying the vital risk factors in a new environment is extremely important. An effective risk management method can help in understanding not only what kinds of risks are faced, but also how to manage these risks at the stages of contracting and construction*" (Zhi, 1995, p. 231).

In fact, Zhi's stance is supported by many recent studies, for example those of Han and Diekmann (2001), Cooke-Davies (2002), Howes and Tah (2003), Ling and Hoi (2006), Lowe (2007), Kulatunga *et al.*, (2009), Toor and Ogunlana (2009), Tang *et al.* (2012), Yong and Mustaffa (2013), and Low *et al.* (2015).

International external risk factors generally consist of political, economic, legal, cultural (languages and religious differences) and social risks (Li *et al.*, 1999; Wang *et al.*, 2004). These risk factors play an imperative role on a firm's strategic bidding decisions for an international construction project (Han *et al.*, 2005), which can spook contractors to venture overseas (Han and Diekmann, 2001b). However, cultural and social risk factors play a less important role in international construction projects compared to political, economic and legal risks (Li *et al.*, 1999; Low *et al.*, 2015).

It appears that, as international bidding decisions become difficult and complicated (Han and Diekmann, 2001a, 2001b; Han *et al.*, 2005; Low *et al.*, 2015), construction firms seem to be increasingly risk averse (Han *et al.*, 2005), and "*some tend to make international entry decisions based on personal intuition or previous experience*" (Messner (1994) as cited in Han and Diekmann, 2001b, p. 300). Similarly, Low *et al.* (2015) point out that, generally, decision-making tends to suffer deviation from rationality, especially during an uncertainty situation.

In this study, the barriers to construction market entry in Saudi Arabia are categorised into seven clusters that consist of political, economic/business, financial, climatic/geographic, project related, local management, and local partners' factors. These clusters are adopted from the study of Lowe (2007). Each cluster involves different

number of international construction critical success factors (IC-CSFs) to test their applicability and importance levels to local and international contractors would intend to invest in the Saudi construction industry under PPP schemes. Hence, after a comprehensive review of the literature regarding IC-CSFs, 65 factors were identified in this study. These factors are fundamentally derived from the following studies: Zhi (1995), Langford and Rowland (1995), Pietroforte (1996), Wang *et al.* (1999), Chatterjee (2000), Han and Diekmann (2001b), Howes and Tah (2003), Ling and Hoi (2006), and Lowe (2007). As a result, these factors can be seen in Table 2.3 with respect to their chronological order and to their replication in each study.

Table 2.3: International Construction Critical Success Factors identified from the literature review

International Construction Critical Success Factors identified from the literature review											
No	Factor Description	Category	Zhi (1995)	Langford and Rowland (1995)	Pietroforte (1996)	Wang <i>et al.</i> (1999)	Chatterjee (2000)	Han and Diekmann (2001b)	Howes and Tah (2003)	Ling and Hoi (2006)	Lowe (2007)
1	Political stability	<b>Political Factors</b>	√	√		√	√	√	√	√	√
2	Government policies towards foreign trade and investment		√	√		√	√	√	√	√	√
3	Legislation		√	√		√	√	√	√	√	√
4	Government restrictions and embargos on foreign companies in order to protect the domestic market		√			√	√	√	√	√	√
5	Corruption		√			√	√	√	√	√	√
6	Delays in approvals and permits		√			√	√	√	√	√	√
7	War, <i>coup d'état</i> , disturbances or terrorist attacks		√	√		√	√	√	√	√	√
8	Labour and immigration restrictions		√			√	√	√	√	√	√
9	Expropriation of foreign assets		√			√	√	√	√	√	√
10	Social and demographic factors		√			√	√	√	√	√	√
11	The overall state of the economy	<b>Economic/ Business Factors</b>	√	√					√	√	√
12	Trading standards								√	√	√
13	Business ethics								√	√	√
14	Employment regulations					√			√	√	√
15	Business culture								√	√	√
16	Exchange rate fluctuations	<b>Financial Factors</b>	√			√	√	√	√	√	√
17	Interest rates		√			√	√	√	√	√	√
18	Capital supply		√				√		√	√	√
19	Credit ratings						√		√	√	√
20	Repatriation of funds						√		√	√	√
21	Inflation		√				√	√	√	√	√
22	Taxes		√				√	√	√	√	√
23	Cash flow		√	√			√	√	√	√	√



No	Factor Description	Category	Zhi (1995)	Langford and Rowland (1995)	Pietroforte (1996)	Wang <i>et al.</i> (1999)	Chatterjee (2000)	Han and Diekmann (2001b)	Howes and Tah (2003)	Ling and Hoi (2006)	Lowes (2007)	
24	Rainfall levels	<b>Climatic/ Geographic Factors</b>							√		√	
25	Temperature fluctuations								√		√	
26	Wind speeds								√		√	
27	Snowfall								√		√	
28	Humidity								√		√	
29	Earthquakes						√		√		√	
30	Floods						√		√		√	
31	Drought					√		√		√		
32	Geography	<b>Project Factors</b>	√					√				
33	Labour availability		√						√		√	
34	Material availability		√						√		√	
35	Resources and supply chain availability		√						√		√	
36	Subcontractor availability		√				√		√			
37	Standards and codes		√	√			√	√	√		√	
38	Contract forms		√	√				√	√		√	
39	Contract conditions		√	√				√	√		√	
40	Measurement system		√	√				√	√	√	√	
41	Litigation system		√	√			√	√	√	√	√	
42	Domestic requirements		√	√				√	√	√	√	
43	Safety and health care		√					√	√	√	√	
44	Management skills		√						√		√	
45	Experience		√						√		√	
46	Warranty agreement		√	√					√		√	
47	Import/export regulation		√						√		√	
48	Technology transfer		√						√			
49	Infrastructure		√						√			
50	Public resistance		√	√					√			

No	Factor Description	Category	Zhi (1995)	Langford and Rowland (1995)	Pietroforte (1996)	Wang <i>et al.</i> (1999)	Chatterjee (2000)	Han and Diekmann (2001b)	Howes and Tah (2003)	Ling and Hoi (2006)	Lowe (2007)
51	Knowledge in cultural matters	<b>Local Mgt. Factors</b>	√	√				√		√	√
52	Knowledge in pre-qualification and tendering procedures			√				√			√
53	Business set up and company registration matters			√							√
54	The characteristics of the legal system			√							√
55	Political and social considerations		√	√							√
56	Financial management		√	√				√			√
57	Environmental matters		√	√				√			√
58	Knowledge in terms of cultural, political, social matters and legal systems	<b>Local Partners Factors</b>	√		√			√		√	√
59	Financial Knowledge in terms of local rates, prices for materials, plant and labour		√		√			√		√	√
60	Knowledge of local regulations and processes required to obtain approvals from government authorities and/or bodies		√		√			√		√	√
61	Accessibility to ready-made contacts within the industry				√						√
62	Existing relationships with suppliers and other vendors				√						√
63	Existing experience in qualified employees and labourers				√						√
64	Possession of plant and equipment				√						√
65	Enhancement to the overall capability and experience				√						√

## **2.9. Summary of Chapter Two**

This chapter represents the heart or the main body of the thesis. The researcher adopted a qualitative writing pattern in order to comprehensively present this chapter. The main aim in this pattern is to effectively present the means in which the aims and objectives of the research subject should be fulfilled under a logical and sequential structure to be implemented.

Firstly, this chapter has introduced the subject of the research and the rationale and background behind the study, through details the main problem and the gap that needs to be addressed in this study, as well as the manner in which this problem have been investigated through a review of available literature. In particular, This chapter has investigated the importance of adopting a strategic project management (SPM) approach for projects orientation organisation by adopting portfolio project management (PPM) and risk management (RM) as strategic tools that enable SPM to be aligned with the mission, goals, and objectives of an organisation. In other words, this allows the organisation's strategy to be linked across its three levels (strategic, tactical, and operational), and thence success can be achieved at both organisational and project levels. The previous literature has emphasised that this strategic alignment is crucial for project selection and strategic bidding decisions, in order to make successful investment decisions.

Secondly, this chapter has established the importance of risk management tools and techniques at both organisational and project levels. In particular, the literature recommends applying the risk maturity model to assess the risk management capability of a construction organisation's management, in order to benchmark its activities and realise what is missing in a dynamic environment. Regarding the project level, this chapter focused on the strategic bidding process of a construction project, especially in PPP overseas projects, from the perspective of risk management. Then, the findings of other researchers in relation to risk identification for the bid/no bid decision in a construction project generated a list of critical success factors, gathered from a comprehensive literature review. The key factors, which is presented in Tables 2.1, 2.2, and 2.3, identified from the literature review and related to the following subjects: bid/no bid decision key factors, public private partnership CSFs, and international construction

CSFs. These factors will be investigated in terms of their applicability and efficiency to the Saudi Construction industry, as will be discussed in the next chapter.

In brief, this chapter, after reviewing previous literature interested in bidding-decision models and critical success factors, found that none of the previous studies had established a link between the strategic project management and the bid/no bid decision for international PPP construction project from the perspective of risk management. Also, none of the previous studies had established a multi-criteria-decision-model (MCDM) that is capable of facilitating contractors bidding decisions by considering their strategic policies and assessing their current situation for effective and successful decisions, in addition to the unique criteria and sensitive PPP policy of the project.

Moreover, none of the previous studies have identified CSFs that are crucial and appropriate to be considered for Large-size International PPP projects. Furthermore, none of the previous models have specified the user of the model based on the type of work, annual business volume, main client type, and the degree of classification. Finally, with respect to all of the above, none of the previous models produced a web-based-model with a database facility that is capable of establish a recording mechanism for evaluating projects that can capture the relevant strategy and situation of the organisation at the time of the decision, and then save it for further purposes; such as reviewing the project and/or learning from the past projects.

## **CHAPTER 3: RESEARCH METHODOLOGY**

### **3.1. Introduction**

After defining the research aim and objectives, and identifying the unique research gaps, the thesis proceeds with this chapter, to present a comprehensive explanation of the methodology used to achieve its stated aim and objectives. This chapter therefore gives a comprehensive account of the methodology that was used when conducting this research. Issues such as the knowledge claims, strategies of enquiry and specific research methods adopted were discussed, and the combination of the research philosophy, strategies and methods provided the framework for the research.

### **3.2. Research Design/Approach**

The research design or approach, according to Creswell (2003), involves the intersection of philosophy, strategies of enquiry, and specific methods. There is the need to first establish how claims are made about what knowledge is: ‘ontology’, how it is known ‘epistemology’, what value goes into it ‘axiology’, how it is written about ‘rhetoric’, and the processes for studying it ‘methodology’. All these rest on philosophical assumptions which affect the way that claims are made about knowledge that is intended to be upheld or generated.

In order to explain how these three elements (knowledge claims, strategies, and methods) combine in practice, Creswell (2003) drafts several typical research scenarios, as shown in Table 3.1. It is valuable for this study to discuss the main philosophical approaches, and in this respect, it is noted by Creswell (2003; 2009), that three potential options exist, these being: quantitative, qualitative, and mixed methods as approaches for performing a research.

**Table 3.1: Four Alternative Combinations of Knowledge Claims, Strategies of Inquiry, and Methods**

*Source: Adapted from Creswell (2003), Research Design, Qualitative, Quantitative and Mixed Methods Approach.*

	<b>Research Approach</b>	<b>Knowledge Claims</b>	<b>Strategy of Inquiry</b>	<b>Methods</b>
1	Quantitative	Postpositivist assumptions	Experimental design	Measuring attitudes, rating behaviours
2	Qualitative	Constructivist assumptions	Ethnographic design	Field observations
3	Qualitative	Emancipatory assumptions	Narrative design	Open-ended interviewing
4	Mixed methods	Pragmatic assumptions	Mixed methods design	Closed-ended measures, Open-ended observations

Table 3.1 above, shows the different approaches, the varying philosophical worldviews in each of them, and their strategies of enquiry, as well as possible methods employed in each approach. These three research approaches (quantitative, qualitative and mixed methods) are therefore discussed regarding: their philosophical paradigms, the types of strategies of enquiry adopted, and the research methods employed.

There is a long-standing epistemological debate between philosophers of science and methodologists regarding the best method for conducting research, which centred on two fundamentally different and competing schools of thought or inquiry paradigms for the philosophy of knowledge; logical positivism and the phenomenological ‘interpretive science’ (Amaratunga *et al.*, 2002). While logical positivism uses quantitative and experimental methods to test hypothetical-deductive generalisations to facilitate analysis, phenomenological ‘interpretivism’ uses qualitative and naturalistic methods to inductively and holistically understand human experience in context-specific settings (Amaratunga *et al.*, 2002; Carter and Fortune, 2004). This leads us to understand that quantitative methods are focused on the discovery of causes and facts; whereas qualitative methods take into account the perception of the participants, seeking explanations and opinions.

The study of the built environment in general, and the construction industry in particular, draws on a wide variety of established subjects and disciplines, including natural sciences, social sciences, engineering and management. However, construction management research can be positioned between the natural and the social sciences, because it involves people as well as organisations to create a knowledge base (Amaratunga *et al.*, 2002; Love *et al.*, 2002). In addition, Carter and Fortune (2004) point out that construction management researchers draw their methodology from both science and arts disciplines.

Actually, regarding the built environment, when a researcher interacts with measurements, hard data, facts, as well as issues, ideas and people, one specific methodology is insufficient to obtain the required solution effectively and efficiently. Therefore, there is a strong argument in favour of engaging a methodology that navigates a midpoint between the extremes of positivism and idealism or interpretivism method, which is known as mixed methods approach. In terms of philosophical assumptions that underpin mixed methods approach for a research, Cresswell (2003; 2009) and Tashakkori and Teddlie (2003; 2010) suggest the pragmatism philosophy as the best worldview or paradigm that best suits mixed methods research. The effectiveness of such a mixed methodology would rest on the premise that the weaknesses in the individual methods would counter-balance the strengths of the others. This type of middle or balanced methodology is known as the mixed or triangulation methodology (Amaratunga *et al.*, 2002; Carter and Fortune, 2004).

However, there is significant weight behind the belief that pragmatism is the best philosophical basis for mixed methodology research (Tashakkori and Teddlie, 2003; Hanson *et al.*, 2005). Hence, the Pragmatism worldview, leading to the use of a mixed methods research design will be adopted for this research methodology. Further explanations and justifications for this adoption are discussed in the following sections.

### **3.2.1. Mixed Methods Approach**

According to Creswell and Clark (2011) the mixed methods approach dates back to the late 1980s with the coming together of several publications from different disciplines (i.e. management, sociology, evaluation, education, and nursing) all focused on describing and defining what is now known as mixed methods, which contributed to the development of the mixed methods research.

It is worth noting that different definitions have been advanced for mixed methods research from the authors of these early publications. For example, Greene *et al.* (1989) defined mixed methods designs as those designs that include at least one quantitative method and one qualitative method, where neither type of method is inherently linked to any particular enquiry paradigm. In the same vein, Tashakkori and Teddlie (1998) described mixed methods as the combination of qualitative and quantitative approaches in the methodology of a study. These two definitions only view mixed methods as a mixture of philosophy and methods from both qualitative and quantitative research in a single study. Furthermore, Creswell and Clark (2011) point out that the work of Johnson *et al.* (2007) provided a more composite definition of mixed methods, after reviewing 19 different definitions provided by 21 highly published mixed methods researchers. Hence, they defined mixed methods research as a type of research in which a researcher or team of researchers combine elements of qualitative and quantitative research approaches (i.e. use of qualitative and quantitative viewpoints, data collection, analysis and inference techniques) for the purpose of breadth and depth of understanding and corroboration.

With these definitions in mind and the fact that most mixed methods research stems from several distinct ideas, Creswell and Clark (2011) opined that a definition that combines methods, a philosophy and a research design orientation or core characteristics of mixed methods research is worthwhile. Consequently, Creswell and Clark (*ibid*) then presented these core characteristics of mixed methods research to be as follows:

- i. Both qualitative and quantitative data are collected and analysed persuasively and rigorously;
- ii. Integration of these two forms of data is done sequentially by having one built on the other concurrently by combining them or embedding one within the other;
- iii. Priority is given to one or to both forms of data depending on what the research emphasises;
- iv. Researchers use these procedures in a single study or in multiple phases of a program of study;
- v. Researchers frame these procedures within philosophical worldview and theoretical lenses; and
- vi. Combine the procedures into specific research designs that direct the plan for conducting the study.



### 3.2.2. Reasons for Mixing Quantitative and Qualitative Research Approaches

It is important at this point to identify the reasons for the development of the mixed methods approach. There are many reasons for combining qualitative and quantitative research approaches. Bryman (2006; 2012, p. 633) provided a detailed list of reasons based on researchers' practices, which can be seen in the following Table 3.2.

However, Creswell and Clark (2011) argued that being responsive to new insights is an essential aspect of conducting mixed methods research; thus the list of reasons presented in Table 3.2 should not be seen as being conclusive, but should be viewed as a general framework from which researchers can weigh up alternative choices and use to justify their decision to use mixed methods. This assertion corroborates the opinion of Bryman (2006) when he noted that many researchers employ these methods for multiple reasons and that new reason for mixing may emerge while the study is underway.

**Table 3.2: Reasons for mixing qualitative and quantitative research methods**

Reason	Description
<b>Triangulation or greater validity</b>	Refers to the traditional view that quantitative and qualitative research might be combined to triangulate findings in order that they may be mutually corroborated. If the term was used as a synonym for integrating quantitative and qualitative research, it was not coded as triangulation
<b>Offset</b>	refers to the suggestion that the research methods associated with both quantitative and qualitative research have their own strengths and weaknesses so that combining them allows the researcher to offset their weaknesses to draw on the strengths of both.
<b>Completeness</b>	Refers to the notion that the researcher can bring together a more comprehensive account of the area of enquiry in which he or she is interested if both quantitative and qualitative research are employed.
<b>Process</b>	Quantitative research provides an account of structures in social life but qualitative research provides a sense of process.
<b>Different research questions</b>	This is the argument that quantitative and qualitative research can each answer different research questions, but this item was coded only if authors explicitly stated that they were doing this.
<b>Explanation</b>	One of the two research methods is used to help explain findings generated by the other.

<b>Unexpected results</b>	Refers to the suggestion that quantitative and qualitative research can be fruitfully combined when one generates surprising results that can be understood by employing the other.
<b>Instrument development</b>	Refers to contexts in which qualitative research is employed to develop questionnaire and scale items, for example, so that better wording or more comprehensive closed answers can be generated.
<b>Sampling</b>	Refers to situations in which one approach is used to facilitate the sampling of respondents or cases.
<b>Credibility</b>	Refers to suggestions that employing both approaches enhances the integrity of findings.
<b>Context</b>	Refers to cases in which the combination is rationalized in terms of qualitative research providing contextual understanding coupled with either generalizable, externally valid findings or broad relationships among variables uncovered through a survey.
<b>Illustration</b>	Refers to the use of qualitative data to illustrate quantitative findings, often referred to as putting ‘meat on the bones’ of ‘dry’ quantitative findings.
<b>Utility or improving the usefulness of findings</b>	Refers to a suggestion, which is more likely to be prominent among articles with an applied focus, that combining the two approaches will be more useful to practitioners and others.
<b>Confirm and discover</b>	This entails using qualitative data to generate hypotheses and using quantitative research to test them within a single project.
<b>Diversity of views</b>	This includes two slightly different rationales, namely, combining researchers’ and participants’ perspectives through quantitative and qualitative research respectively and uncovering relationships between variables through quantitative research while also revealing meanings among research participants through qualitative research.
<b>Enhancement or building upon quantitative/ qualitative findings</b>	This entails a reference to making more of or augmenting either quantitative or qualitative findings by gathering data using a qualitative or quantitative research approach.

In addition to the reasons mentioned in the table above (Table 3.2), Creswell (2003) emphasises the importance of researchers having a sound understanding of their researches needs, which are to answer the research questions and to achieve its aim and objectives, since such understanding will enable the researcher to appreciate what potential research designs and methods might be useful to them, and clarifying which of

all of these will be the most likely to help in achieving their aims and objectives. Therefore, as identified in Chapter 1: Research Aim and Objectives; this research requires a variety of tasks to be conducted, including observation, exploration, confirmation and then a review of the findings. The observations will be to determine the following: how the bid/no bid decision has been made in practice in contractor organisations conducting PPPs in the Saudi Arabian construction industry, how the bid/no bid decision is influenced by risk management assessment for PPP the Saudi Arabia context, and how the bid/no bid decision is influenced by international investment barriers and success factors, in addition to the project, client, and bidding characteristics.

Also, the exploration phase will consider what factors and/or barriers should be evaluated, and how the development of a strategic RM decision model can contribute to the overall enhancement of the international contractor organisation's performance. The findings from such an investigation are assumed to have potential value for assisting in the creation of a strategic RM decision model for international investment in PPPs projects, and thus result in a system that builds the link between risk management and successful bid/no bid decisions.

In details, regarding the intended model, this research aims to facilitate international contractors' decisions to invest in PPP projects by creating a strategic RM decision model for this purpose, by investigating related critical success factors and barriers to entry to a new and overseas industry, such as the PPP market in Saudi Arabia. Thus far, there is no previous study assessing the bid/no bid decision and the interaction of the risk management process with public private partnership and international investment in Saudi Arabian construction industry with respect to a project characteristics, strategic project management, and the organisation's strategy.

It can therefore be claimed that there are inadequately defined problem areas relating to bid/no bid decisions, especially for the Saudi Arabian context. Thus, the aim and objectives of this research are based on an exploratory framework; this form of research enables the researcher to investigate, understand and identify the particular problems that influence bid/no bid decisions of international investors who intend to invest in PPPs in Saudi Arabia construction industry, and thence, assess the findings by an empirical confirmatory study, which will be implemented to confirm the factors affecting the bid/no

bid decision of contractor organisations, and then, to be applied for the intended model. These two studies will then be combined to accomplish the identified objectives. Hence, the pragmatism worldview, leading to the use of a mixed methods research design is the best option for this research methodology in order to achieve the research aim and objectives.

Moreover, this study involves investigations of complex interactions between the performance of people and organisations', construction processes, decision making problems and technical difficulties in the practice of real projects. Therefore, the adoption of the pragmatist paradigm with a triangulation or mixed methodology philosophy will allow for a qualitative approach as the general overall research approach, and will also allow for the quantitative approach to be implemented where appropriate. Such a philosophical perspective for the research influences the selection of a proper research strategy and method as will be clarified in the following sections.

### **3.3. The Research Paradigm and Philosophy**

According to Bryman (2012), the term 'paradigm' derives from Kuhn's (1970) analysis of revolutions in science, and can be defined as a cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, how research should be done, and how results should be interpreted. Thus, the underlying perspective held by a researcher when conducting any study is referred to as the research paradigm and within this is embedded a particular philosophy. The research paradigm is an extremely important aspect of the entire subject of research methodology, since only when this is established can the researcher decide the most effective and appropriate way of collecting data.

Creswell (2003) emphasises the importance of researchers having a sound understanding of their philosophical stance in this respect, since such understanding will enable them to appreciate what potential research designs and methods might be useful to them, and clarifying which of all of these will be the most likely to help in achieving their aims and objectives. Moreover, by reviewing their personal research philosophy, researchers can increase their knowledge of how best to conduct the research process and this can result in greater confidence in the methodology eventually chosen (Holden and Lynch, 2004).

For this study, in order to produce a research methodology that guides the process of collecting, analysing, and interpreting data for this research, it is required to first establish the epistemological premise on which the research stands. In other words, to apply the most suitable research plan, approach or design to achieve the objectives of this research towards the main aim, which is to develop a strategic risk management decision model for PPP projects which can help international contractors to make the right decisions when investing in the Saudi Arabian construction industry.

In fact, in any academic research, significant consideration must be given to understanding the philosophical assumptions that underpin the research. Saunders *et al.* (2009) argue that the research philosophy is significantly influenced by the way a researcher views the development of knowledge, as this will influence the way he or she goes about the research itself. Indeed, it contains important assumptions concerning the way people view the world. The selection of a research philosophy by the researcher will depend on the research questions. Additionally, the adapted research strategy will be strongly influenced by the researcher's preferred approach (Yin, 2003). According to Saunders *et al.* (2009) and Yin (2003) research philosophy in general can be conceptualised in terms of three sets of philosophical assumptions relating to ontology, epistemology, and axiology. These philosophical assumptions are very important for outlining and understanding the way a researcher can be helped to frame the research process (Klenke, 2008; Saunders *et al.*, 2009). Further, Grix (2002) and Bahari (2010) note that the researcher's ontological and epistemological positions can lead to different views of the same social phenomena, affecting the methods in which a researcher thinks about the research process.

### **3.3.1. Epistemological Assumptions**

Epistemology is one of the core branches of research philosophy, which relates to the ways in which reality can be perceived and interpreted, as well as what constitutes acceptable knowledge in a field of study (Bryman and Bell, 2007). In other words, it is about how we gain knowledge or understand social reality. Therefore, epistemology concerns the acquisition of knowledge, in terms of its methods, validation and '*the possible ways of gaining knowledge of social reality, whatever it is understood to be. In short, claims about how what is assumed to exist can be known*' (Blaikie, 2000, p. 8). Moreover, according to Grix (2002) the importance of epistemology is that it informs the

method to be employed in order to gain knowledge; however, knowledge is dynamic by nature, as the knowledge and the method employed for discovering it, are not static, but forever changing. And in this respect, epistemological assumptions are classified into three different approaches to research, these being: the positivism, the interpretivism, and the realism approaches (Bryman and Bell, 2007; Saunders *et al*, 2003; 2009).

Regarding the positivism position, Bryman and Bell (2007, p. 16) define positivism as “*an epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond*”. Positivism is bound up with the philosophy of natural sciences that comprise the view of knowledge as consisting of truths or facts about the real world under study and the truth that can be captured and studied by the five senses and appropriate methods (Andreski, 1974). Also, Remenyi *et al.* (1998, p. 32) state that positivism is an epistemological position that works “*with an observable social reality and that the end product of such research can be law-like generalisation similar to those produced by the physical and natural scientist*”. Furthermore, Saunders *et al.* (2009) support this view and explain that the approach depends on an observable social reality as an objective based on a highly structured methodology to facilitate generalisation and quantifiable observations. The result can then be evaluated through statistical methods.

As a result, the fact of being a positivist researcher tends to mobilise existing theory in order to develop hypotheses about what happens in the social world by finding regularities and causal relationships between its constituent elements (Saunders *et al.*, 2009; Bahari, 2010). Hence, the positivist researcher is also known as the ‘resource’ researcher as he or she will be concerned with facts rather than impressions (Saunders *et al.*, 2009).

Accordingly, positivist researchers are more likely to employ a quantitative approach, as the positivist approach views the world as an observable social reality linked to hypotheses that examine quantitatively (Remenyi *et al.*, 1998; Saunders *et al*, 2009). Therefore, following a positivist methodology, researchers apply an objective analysis and remain independent of the research itself (Remenyi *et al.*, 1998; Saunders *et al.*, 2009). A central principle of positivism is that research should be value-free, so the ‘resource’ researchers and their study are driven by objective criteria, which can be observed and described from an objective viewpoint, rather than by individual beliefs and

interests (Saunders *et al.*, 2009; Bahari, 2010). Further, Burrell and Morgan (1979, p. 5) define positivist research as an “*epistemology which seeks to explain and predict what happens in the social world by searching for regularities and causal relationship between its constituent elements*”. However, since positivism entails an understanding of social science as being value-free, which requires ‘resource’ researchers to remain agnostic in term of ethics, this will not permit any research conducted to be value-free. The diagram of positivist studies seeks to test hypothesis which is inadequate for this study, because the methods utilised tend to be insufficient in investigating detailed questions aiming to gather participants’ views about a specific situation (Bryman, 2012).

The second philosophical assumption to be discussed is the interpretivism, which is another branch of epistemological assumptions. The interpretivists are also referred to as antipositivists (Burrell and Morgan, 1979). This can be seen as an epistemological position that researchers must adopt in order to be able to understand differences between humans in their role as social actors (Saunders *et al.*, 2009). It is also referred to as ‘social constructionism’ (Robson, 2011) indicating that reality is socially structured and is seen as in opposition to a positivist approach, as it assumes there is no objective reality, but is rather structured by the fact there are many and varied interpretations of such social reality by different individuals. Thus, due to this fact, social actions are understood by different people in different ways as it is influenced by their values and other individuals’ interpretation of this social reality. Hence, their views are considered to be the realities that social science researchers should direct their attention to as these offer a subjective meaning for such social action (Bryman, 2012; Robson, 2011; Saunders *et al.*, 2009; Bryman and Bell, 2007).

In detail, interpretivism holds the view that the “*world is essentially ‘relativistic’ and can only be understood from the point of view of the individuals who are directly involved in the activities which are to be studied*” (Burrell and Morgan, 1979, p. 5). Interpretivist researchers are also known as the ‘feeling’ researchers. “*This is due to the fact that interpretivist researchers play a role as ‘social actors’ where they could interpret their everyday social roles in accordance with the meaning given to these roles and interpret the social roles of others in accordance with our own set of meanings*” (Saunders *et al.*, 2007, p. 106).

Finally, the third philosophical assumption to be discussed is the realism. Thus, according to Saunders *et al.* (2009), realism is a branch of epistemology which emphasises a philosophical position relating to scientific enquiry, based on the perspective that a reality may be seen as an objective that it is possible to know, which is quite independent of human thoughts, beliefs or knowledge and thus opposed to epistemological idealism. Also, realism assumes that what the senses show us is reality, i.e. the truth, since this assumption supports the view that the existence of the social world is external to the researcher and can only be accessed and discovered through the senses and research (*ibid*). However, this assumption shares two philosophical features with positivism: 1) it assumes a scientific approach to the development of knowledge, as it adopts the same approach for studying the natural and social worlds and is concerned with discovering truths about the social world, and 2) the belief that there is an external reality towards which the researcher must direct his or her focus, since such a reality is independent from the researchers' thoughts (Bell and Bryman, 2007; Saunders *et al.*, 2009).

According to Saunders *et al.* (2009, p. 115), there are two types of realism to be noted, these being, direct and critical. Direct realism emphasises that, through appropriate methods, reality can be understood, and thus what we see is what we get. It “*relates the capacity of research to change the world which it studies*”. It involves the perception that the world is relatively unchanging and operates only at one level in an individual, group, and organisation. While the second kind of realism is called ‘critical realism’, which argues that experiences are only images of things in the real world, not the things per se. Furthermore, critical realism emphasises that the human senses deceive us and, therefore, the seen reality in the real world varies from the one perceived by our mind. And it recognises the reality of the natural order and the events and discourses of the social world that can only be identified through the practical and theoretical work of the social sciences.

Unlike positivism, which works with fixed data, critical realism does not see the world as a fixed set of data, but is more flexible about seeing data and information as dynamic and changeable as it considers that the world operates at multi-levels which are worth studying, for example, at the level of the individual, the group and the organisation (Saunders *et al.*, 2009). Moreover, critical realism looks at data and information as an opportunity to further and deepen discussion.



### **3.3.2. Ontological Assumptions**

According to Blaikie (2000, p 8) ontology refers “*to the claims and assumptions that are made about the nature of social reality, claims about what exists, what it looks like, what units make it up and how these units interact with each other. In short, ontological assumptions are concerned with what we believe constitutes social reality*”. In this sense, since this assumption is concerned with the nature of reality or social entities, it deals with what is believed to exist and can be investigated.

According to Saunders *et al.* (2009, p. 110), there are two kinds of position under ontological considerations: objectivism and subjectivism. The objectivism position emphasises that the existence of social phenomena is “*external from social actors*”, while the subjectivism position states that social phenomena are “*created from the perceptions and consequent actions of social actors*”. In other words, according to the objectivism position, social phenomena that are used in everyday discourse have an existence that is independent from actors (Bryman and Bell, 2007), while the subjectivism position refers to the assumption that the social world is ‘constructed’ by actors, whether individuals or groups, who create the ‘reality’ in which they operate (Burrell and Morgan, 1979).

### **3.3.3. The Pragmatic Worldview**

In terms of philosophical assumptions or worldviews that underpin mixed methods research, Tashakkori and Teddlie (2003) point out that at least 13 different authors embrace pragmatism as the worldview or paradigm that best suits mixed methods research. Thus, pragmatism is generally regarded as the philosophical partner for the mixed methods approach (Cresswell, 2009). This gives rise to the need to describe what pragmatism is all about. According to Cherryholmes (1992), pragmatism was derived from the work of Charles Sanders Peire, William James, Mead and John Dewey. He opined that knowledge claims in mixed methods arise out of actions, situations and consequences rather than antecedent conditions (as in postpositivism). There is a concern regarding the applications of ‘what works’ and solutions to problems. Tashakkori and Teddlie (1998) suggested that rather than methods being important, the problem is most important and researchers should use all approaches to understand the problem. Cresswell (2009, p. 10), in his interpretation of the works of all these writers on pragmatism, provided the following basis for the use of the pragmatism approach.

- Pragmatism is not committed to any one system of philosophy and reality; this applies to mixed methods research in that enquirers draw liberally from both quantitative and qualitative assumptions when they engage in their research;
- Individual researchers have a freedom of choice; they are free to choose the method, techniques, and procedures of research that best meet their needs and purposes;
- Pragmatism does not see the world as being in absolute unity. Similarly, mixed methods researchers look to many approaches to collecting and analysing data rather than subscribing to only one way (e.g., quantitative or qualitative);
- Truth is what works at the time; it is not based on a duality between reality independent of the mind or within the mind. Thus, in mixed methods research, investigators use both qualitative and quantitative data because they work to provide the best understanding of a research problem;
- Pragmatist researchers look to the ‘what’ and ‘how’ to research based on the intended consequences and ‘where’ they want to go with it. Mixed methods researchers need to establish a purpose for their mixing and a rationale for the reasons why quantitative and qualitative data need to be mixed in the first place.
- Pragmatists agree that research always occurs in social, historical, political, and other contexts. In this way, mixed methods studies may include a postmodern turn, a theoretical lens that is reflective of social justice and political aims.
- Pragmatists have believed in an external world independent of the mind as well as that lodged in the mind. But they believe that we need to stop asking questions about reality and the laws of nature. *“They would simply like to change the subject”*.
- Thus, for the mixed methods researcher, pragmatism opens the door to multiple methods, different worldviews and different assumptions, as well as different forms of data collection and analysis.

Hence, for this research’s philosophical considerations, the adoption of the pragmatic worldview with a realist position in general, leading to a triangulation or mixed methodology to be applied, will allow for a qualitative approach as the general overall research approach, and will also allow for the quantitative approach to be implemented where appropriate. Such a philosophical perspective for the research influences the

selection of a proper research strategy and method as will be clarified in the following sections.

### **3.4. The Research Strategy**

Research studies have, on occasion, been criticised for their anecdotal approach to interpreting real world phenomena, so it can be argued that a clear definition of the research strategy is a priority in a sound and comprehensive empirical study (Amaratunga *et al.*, 2002). It can also be argued that, as claimed by McGrath (1981) in his study about research choices and dilemmas, there are no ideal solutions or strategies for researchers to adopt. Patton (1990) and Amaratunga *et al.* (2002) and a significant number of other studies support the same view point. The most important consideration when designing research is choosing the research type. However, Bryman (2012) points out that it has been common practice to divide research methods into two broad types of research strategy: quantitative and qualitative research. Further, this classification, quantitative or qualitative, is linked to the nature of the relationship between a research theory and the social research. Hence, theory plays a fundamental role in differentiating between a deductive mode of research in quantitative study and an inductive mode of research in a qualitative study, which will be discussed in the following section 3.5.

Furthermore, Yin (2003) points out that a research strategy should be implemented as a function of the research situation, in which each strategy mode, either deductive or inductive, has its own approach to collecting and analysing data, and therefore its own advantages and disadvantages. Thus, according to Cresswell (2003) and Giarre and Jaccheri (2005), a research strategy, in principle, can be applied under one or more of three main types of study, as follows:

- 1) Exploratory study: to structure and identify a new or inadequately defined problem;
- 2) Constructive study: to develop an original solution to a specific problem; and
- 3) Empirical study: to test the feasibility of a solution using empirical evidence.

As discussed before in section 3.2.2: Reasons for mixing quantitative and qualitative research approaches, the aim and objectives of this research are based on an exploratory framework; this form of research enables the researcher to investigate, understand and

identify the particular problems that influence bid/no bid decisions of international investors who intend to invest in PPPs in Saudi Arabia construction industry, and thence, assess the findings by an empirical confirmatory study, which will be implemented to confirm the factors affecting the bid/no bid decision of contractor organisations. These two studies will then be combined to accomplish the identified objectives.

### **3.5. Deductive and Inductive Modes of Research**

The deductive mode of a research tends to proceed from theory to practice and so it is known as the ‘testing theory’ approach, where the researcher uses an existing theory in order to develop a hypothesis and then draws logical conclusions and tests these hypotheses through empirical studies in order to confirm or reject a relationship between the original theory and the hypothesis (Saunders *et al.*, 2009). The data collection is therefore driven by theory and hypothesis. It is the theory which is often applied to guide and acknowledge the development of the research questions and the collection of data and analysis (Bryman and Bell, 2007; Saunders *et al.*, 2009). Also, Saunders *et al.* (2009) point out that the deductive mode of a research is often associated with quantitative research approach.

In complete contrast, the inductive mode of a research, which is known as building a theory, tends to proceed from practice to theory; as the researcher starts with the collection of data and then analyses this data to build up and develop a theory based on the analysis (Bryman and Bell, 2007; Saunders *et al.*, 2009). An important characteristic of the induction mode of a research, which is common to be adopted in the social sciences, is that it is associated with interpretivism and qualitative research (Easterby-Smith, *et al.*, 2002; Saunders *et al.*, 2009). In inductive research, researchers are more likely to use qualitative methods to collect data from experts in order to gain a closer and deeper understanding of meanings and opinions attached to events in the social phenomena (Easterby-Smith *et al.*, 2002; Saunders *et al.*, 2009).

Yin (2003) points out that the research strategy will depend on the research questions. Additionally, the adapted research strategy will be strongly influenced by the researcher’s preferred approach. Thus, bearing in mind the research questions, gaps, and the research aim and objectives there is a need for this research to conduct two different modes for the

research strategy. Consequently, the pragmatism philosophy is adopted for this research as the worldview or paradigm for mixed methods research approach that allows for two different research strategies to take place alongside each other as needed; thus, this research strategy involves two modes of study. The first mode is an inductive study in the form of an exploratory study that qualitatively attempting to identify the smallest possible set of factors affecting the bidding decision and to define and then evaluate the possible relationship of aspects involved in the study, whereas the second mode is a deductive study in the form of an empirical confirmatory study, which will be implemented quantitatively to confirm the factors affecting the bid/no bid decision of contractor organisations. These two studies will then be combined to accomplish the identified research objectives. Further details about method used for each type of study will be discussed in the following section.

### **3.6. The Research Method**

In practice, the research method will be guided by the research strategy; which is ultimately influenced by the research philosophy (Kagioglou *et al.*, 2000). Research methods relate to the collection of data based on organising research activities and selecting the most appropriate method for collecting data, which satisfies the research aim and objectives (Easterby-Smith *et al.*, 2002) and can be classified into three main categories as follow: (1) Quantitative methods; (2) Qualitative methods; and (3) Mixed methods.

According to Myers and Avison (2002) quantitative research methods focus on studying natural phenomena and were originally developed for the investigation in the natural sciences. These methods, as explained by Fellows and Liu (2003), set out the relationship between facts and theories or previous studies. Thus, they can be used for research which seeks to gather factual evidence for a concept or a question, and/or to examine hypotheses and theories.

Qualitative methods focus on finding answers or explanations for a particular phenomenon which are both based on the individual's experience and knowledge and in line with a scientific perspective. Methods include observation, questionnaires, interviews, the use of texts and documents, and, in addition, recording the researcher's

own responses and thoughts. Finally, the mixed methods involve both quantitative and qualitative methods (Myers and Avison, 2002).

As explained earlier, with the adoption of the mixed methods approach, the research method will be guided by a research strategy that is basically guided by the research philosophy. The adoption of a triangulation approach means that the mixed methods technique will be implemented for this research: the qualitative method will be applied for the exploratory study in the form of interviews, while the quantitative method will be applied in the research, as an empirical confirmatory study, in the form of a questionnaire survey.

### **3.7. Phases of the Selected Research Design**

The pragmatism worldview chosen for this study, which leading to the use of a mixed methods research design. Further, according to Creswell (2009) there are three general procedures/frameworks to design a mixed methods research, as follow:

- 1) Sequential mixed methods design, where the procedures are those in which the researcher seeks to elaborate on or expand on the findings of one method with another method;
- 2) Concurrent mixed methods design, where the procedures are those in which the researcher converges or merges both quantitative and qualitative data in order to provide a comprehensive analysis of the research problem; and
- 3) Transformative mixed methods design, where the procedures are those in which the researcher uses a theoretical lens as an overarching perspective within a design that contains both quantitative and qualitative data.

The sequential mixed methods design is adopted for this research as the best possible design capable of achieving the research aim and objectives. In particular, as explained in section 3.4: The Research Strategy and 3.5: Deductive and Inductive Modes of Research, the aim and objectives of this research are based on two sequential studies. The first is an exploratory study, which enables the researcher to investigate, understand and identify the particular problems that influence bid/no bid decisions of international investors who intend to invest in PPPs in Saudi Arabia construction industry, and thence,

the second study is to assess the findings by an empirical confirmatory study, which will be implemented to confirm the factors (findings from the previous method) affecting the bid/no bid decision of contractor organisations. These two studies will then be combined to accomplish the identified objectives.

Moreover, Fellows and Liu (2003) proposed that the best research design involves employing logic to link data collection processes and analysis to obtain results and conclusions. Thus, the research design in this case was constructed in line with the estimated PhD research programme plan: while the research program plan is focused on periods of time, the research design is focused on tasks and activities. Further, the research design is constructed to resolve different issues, such as what the research intends to achieve, the nature of the research problems, and the fundamental knowledge that needs to be obtained. In detail, the research design itself consists of five phases in order to satisfy the research aim and objectives; these are as follows:

**Phase (1): Literature Review:** to be conducted qualitatively and includes the following tasks:

- Studying the nature of the construction industry and the importance of the bid/no bid decision;
- Studying the general behaviour of decision making and the decision support system (DSS);
- Studying Risk Management tools and techniques, and risk allocation in PPP projects;
- Studying research into public private partnership (PPP) and its success factors; and
- Studying research into international investment and its success factors.

**Phase (2): Qualitative Research Strand:** to be conducted through qualitative interviews and includes the following tasks:

- To explore the efficiency and applicability of the model-input factors that were collected from the literature review;
- To investigate any further potential factors that should be considered from the practical perspective of the Saudi Arabian construction industry;

- To explore the criteria for policies that link the organisation's strategy with bid/no bid decisions;
- To investigate the influence of the organisation's current situation on the bidding decisions;
- To validate the initial concept of the investment decision model; and
- To gather information that could help in the design phase of the main questionnaire survey.

**Phase (3): Quantitative Research Strand:** to be conducted through a quantitative questionnaire survey and includes the following tasks:

- To investigate the link between organisations' RM practice and decision making processes;
- To investigate the need for a rational RM strategic decision model for PPP projects;
- To investigate the level of importance of the factors affecting the investment decision, and then ranking them according to their importance to the contractor organisations; and
- To examine and distinguish different behaviours of contractor organisations in the process of decision-making according to their differences in terms of classification status, size, type of the main client, and the type of work.

**Phase (4): Constructing the web-based model:** to be conducted after the previous phases, and then to be evaluated through validity responses for the following purposes:

- To gather participants' opinions and feedback;
- To examine the model's effectiveness; and
- To validate the model's final concept.

**Phase (5): Establishing the research conclusions, identifying limitations, and formulating recommendations for future work.**



### **3.8. Summary of Chapter Three**

This chapter has discussed the most suitable methodology to be applied in order to achieve the research aim and objectives, and has justified the adoption of the pragmatic mixed methods approach as the most appropriate worldview for research methodology. The nature of the gap in the targeted knowledge in this research has influenced the researcher to adopt such a mixed methods approach, which allows two types of research strategy to be combined in order to accomplish the identified objectives. The first type is an exploratory study attempting to identify the smallest possible set of factors affecting the bidding decision and to define and then evaluate the possible relationship of aspects involved in the study, while the second type is an empirical confirmatory study that will be implemented to confirm the factors affecting the bid/no bid decision of contractor organisations. This then leads to the specific research method applied for each strategy, as the mixed methods technique will be implemented to accomplish different tasks and objectives of the study.

The qualitative method will be applied for the exploratory study, in the form of interviews, while the quantitative method will be applied for the main research, an empirical confirmatory study in the form of a questionnaire survey. Finally, a detailed research design framework has been developed, consisting of five phases as the guide to fulfil the research aim and objectives. The research design, with a summary of the research phases can be seen in the following figure (Figure 3.1).

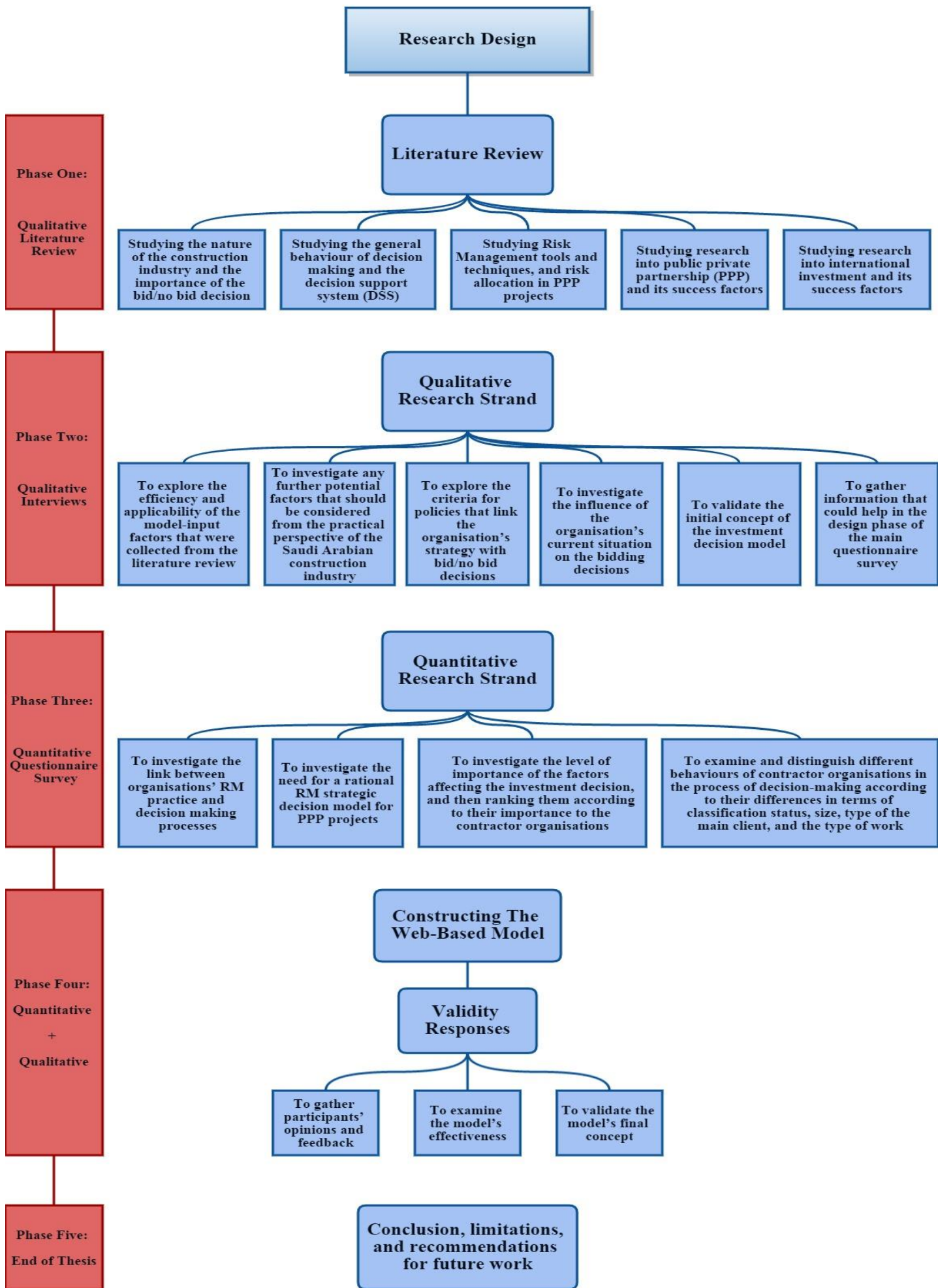


Figure 3.1: Research Design Phases

## **CHAPTER 4: QUALITATIVE RESEARCH STRAND: PRESENTATION, ANALYSIS, AND DISCUSSION**

### **4.1. Introduction**

The previous chapter focused on selecting the most appropriate research methodology, and justifying its adoption. This chapter will focus on the findings from the qualitative interviews and the design and results of the quantitative questionnaire. As discussed in the research design, the second phase of the research, the qualitative research strand, aims to confirm the findings of the Literature Review in terms of the factors affecting international contractor organisations' decisions to invest in public-private partnership projects, in order to test their applicability to the Saudi construction industry.

The second phase was conducted through qualitative interviews with experienced personnel working as decision makers, project managers, and finance managers from both international private and local public sectors in the Saudi construction industry resulted in the identification of seventy-seven potential factors affecting international contractors' bid/no bid decisions for PPP projects in the Saudi Construction industry.

The third phase of the research design, the quantitative research strand, conducted through a quantitative questionnaire survey, aimed to collect data supporting the need to conduct this study and to examine the importance level of the identified seventy-seven factors, is also reported in this chapter. The questionnaire survey designed for this purpose can be seen in Appendix A. The first step for practical data collection will be discussed in the following section.

### **4.2. Research Scope and Required Data**

The scope of the research concerns helping international investors 'decision-makers' in making successful bidding decisions to enter PPP projects in SA. Thus, it focuses on developing a web-based model to enhance international organisations' performance in RM processes through facilitating the bid/no bid decision process. The study aim and objectives (Chapter 1, section 1.3) necessitate the identification of various factors that

influence the bid/no bid decision and are applicable to the Saudi Arabian construction industry. Previous studies have identified a large number of factors; however, the results of those previous studies differed in terms of the number of factors listed in their questionnaire surveys and weights of importance given to factors, as the surveys covered different countries.

As stated in the statement of the research problem (Chapter 1, section 1.3), most of the studies that focused on the bid/no bid subject relied on the identification of factors explored in the study by Ahmad and Minkarah in 1988. Also, each of these previous studies identified certain factors associated with that study context and not mentioned in other studies as covered in the literature review chapter. This necessitates a revision of these factors' influence on organisations' bidding decisions for PPP market in Saudi Arabia, which provide an opportunity for this research to re-examine and identify critical factors and establish and rank their importance with respect to the bidding environment in the Saudi Arabian construction industry. Thus, a list of critical success factors (CSFs), gathered from a comprehensive literature review, which is presented in Tables 2.1, 2.2, and 2.3, and related to the following subjects: bid/no bid decision key factors, public private partnership CSFs, and international construction CSFs will be investigated in terms of their applicability and efficiency to the Saudi Construction industry.

Thus, the data required for phase two of the research are related to identifying the factors that to be examined in the third phase via a questionnaire survey. This is achieved by investigating the effectiveness and applicability to the Saudi Arabian construction industry of the 237 factors, determined from the comprehensive and robust literature review, as presented in the previous chapters. Thus, a conclusive list of the factors to be examined in the survey was required before the design of the questionnaire could begin. This conclusion was obtained through a qualitative research strand comprising twelve interviews conducted with expert personnel from both international and local nationalities working in the Saudi Arabian construction industry. The interviews targeted current and potential PPP projects in Saudi Arabia, especially in the railway network construction field, and the participants are from both private and public sectors.

Finally, the data required for phase three of the research, which is based in the questionnaire and survey, is intended to examine only those factors returned from phase

two, which are related to the Saudi Arabian construction industry, and then to rank these factors based on their level of importance in the context of the Saudi industry in order to use them for designing the web-based model. Thus, phase two of the research design: the qualitative research strand is conducted via interviews to help in collecting data that supports the importance of conducting such a study on this stage of bid decision making, and to shed the light on the need and requirements for such model to be effective in making bid/no bid decisions. The identified data are an initial step towards the development of the web-based model for the bid/no bid decision.

### **4.3. Qualitative Research Strand Approach**

This phase of the research design was conducted through qualitative interviews with the following objectives:

- To explore the efficiency and applicability of the model-input factors collected from the literature review;
- To investigate any further potential factors that should be considered from the practical perspective of the Saudi Arabian construction industry;
- To explore the criteria for policies that link the organisation's strategy with bid/no bid decisions;
- To investigate the influence of the organisation's current situation on the bidding decisions;
- To validate the initial concept of the investment decision model; and
- To gather information that would help in the design phase of the main questionnaire survey.

As pointed out by Yin (2009), the most appropriate method for a specific purpose will be the one that is more inclusive and pluralistic. For that reason, an individual qualitative interview approach is used as the investigation method of this phase. In particular, a semi-structured conversational face-to-face interview type is adopted with open-ended questions. This type of interview allows the interviewer to explore the considered topic from different aspects, and is more likely to produce the required data, in addition to clarifying the findings of previous studies and exploring the practitioners' points of view regarding the interview context areas.

### 4.3.1. Interview Participants

The interviews were conducted with twelve participants working in the Saudi Arabian construction industry, from both public and private sectors. Six interviews were conducted with expert personnel working in Government bodies and the other six interviews were conducted with expert personnel working in international contractor organisations (large-sized organisations with an average annual turnover of more than fifty million Saudi Riyals). From each sector, the participants were: two decision makers' representatives, two project managers, and two finance managers. Further, all of the participants had a minimum of 15 years of experience in their fields as can be seen in Table 4.1.

**Table 4.1: Interview Participants**

<b>Code</b>	<b>Job Function</b>	<b>Years of Experience</b>	<b>Sector</b>	<b>Project Type</b>
<b>1-D</b>	Decision Maker Rep.	24	Public	Rail Network
<b>2-P</b>	Project Manager	15	Public	Rail Network
<b>3-F</b>	Finance Manager	17	Public	Rail Network
<b>4-PD</b>	Decision Maker Rep.	29	Private	Rail Network
<b>5-PP</b>	Project Manager	22	Private	Rail Network
<b>6-PF</b>	Finance Manager	17	Private	Rail Network
<b>7-D</b>	Decision Maker Rep.	27	Public	International Airport
<b>8-P</b>	Project Manager	25	Public	International Airport
<b>9-F</b>	Finance Manager	22	Public	International Airport
<b>10-PD</b>	Decision Maker Rep.	26	Private	International Airport
<b>11-PP</b>	Project Manager	18	Private	International Airport
<b>12-PF</b>	Finance Manager	16	Private	International Airport

Regarding the sample sizes of this qualitative strand, Blaxter et al. (2001) points out that qualitative sample sizes are small and not meant to represent large populations. Thus, purposeful samples of expert personnel are used because of their ability to provide important information, and not because their opinions are believed to be representative of a larger group. In a smaller number of samples, it is possible to explore ideas in detail, to gain more illuminating data, with the aim of achieving depth of understanding rather than breadth. Also, as the interviewees in this qualitative strand were selected according to their experiences and involvement in PPP projects in the Saudi Arabian construction industry, they represented a sound and rich source of information concerning the reality of that particular situation. Consequently, through relating their experiences, opinions, perceptions and reflections on the decision-making processes in their organisations, they

were able to provide data upon which a simple, concrete, and well-defined risk management decision model of that reality could be constructed.

#### **4.3.2. Interview Ethical Procedures**

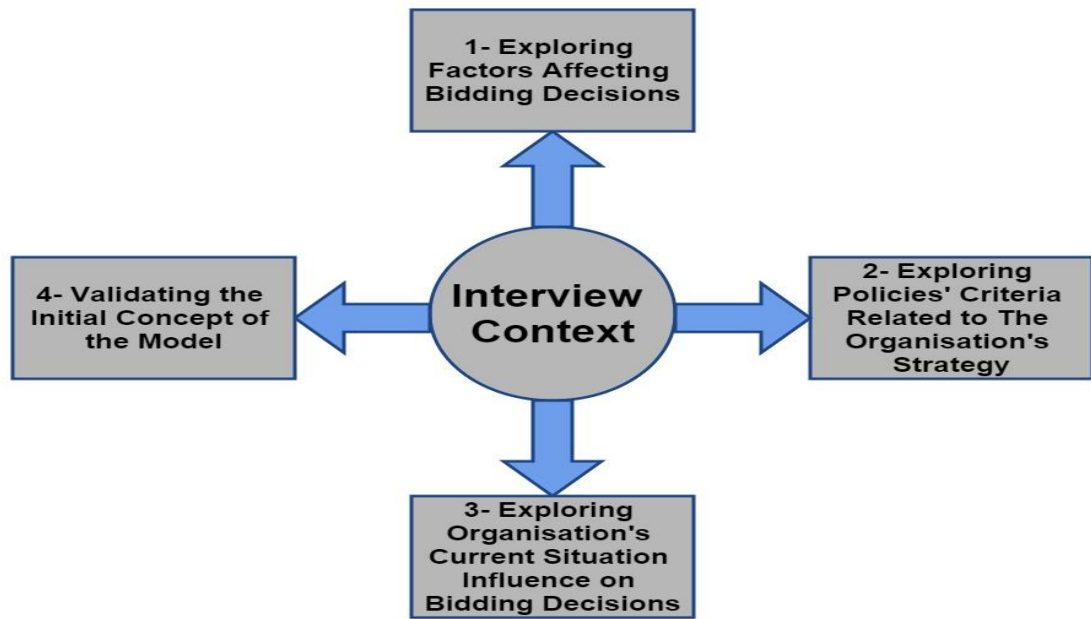
As laid down, in the School of the Built Environment Code of Practice, the participants in this study were notified about their rights and then their permission was obtained in order to consider their contribution to the findings of this study. A request for permission letter, available in Appendix A, explaining the purpose of these interview was provided to the participants and they were also asked for permission to record the interviews. Thus, the protection of the rights of the participants includes the following procedures:

- i. The notification that interviews will be recorded;
- ii. The notification that all information provided will be for the academic use and will remain confidential;
- iii. The assurance of the confidentiality of the names of persons and organisations engaged in the study. Such assurance aims to maximise the participants' input and minimise any negative impact on the research outcomes;
- iv. The notification that their participation is voluntary and that they have the right to refuse to answer any question; and
- v. The notification that no confidential or sensitive information will be published.

#### **4.3.3. Interview Context**

Bryman (2012) points out that one of the major reasons for the participants' failure to provide accurate data is the lack of sequence in the interview context. Therefore, based on the average time allowed, the interview context was designed, to include the following tasks as shown in Figure 4.1:

- 1) Exploring the factors that affect the bidding decisions in the Saudi construction industry;
- 2) Exploring the criteria for policies that link the organisation's strategy with their bidding decisions;
- 3) Exploring the influence of the organisation's current situation on the bidding decisions; and
- 4) Validating the initial concept of the research model.



**Figure 4.1: Interview Context**

The participants were asked general open-ended questions related to the bidding situation and risk management process, in addition to questions about the factors considered and methods applied when deciding to bid or not to bid for a project. At the end of each interview, a check-list of the 237 factors, sent in advance, was reviewed with the participants, and useful points they raised were recorded. It was the researcher's plan to delve deeper into the subject and to ask general questions to gather as much information as possible and from each answer specific questions would arise to clarify each task targeted above. As pointed out by Kvale (1996), it is worth noting that different kinds of questions are usually found in any qualitative interview such as the introducing questions, follow-up questions, specifying questions, and direct and indirect questions.

#### **4.3.4. Interviewer Guide**

Having identified the 'data required' in the interview context, the next step in preparing for interviews is to plan the interviews in terms of considering tips and skills needed as criteria for successful interviews. Kvale (1996) provides a very useful list of the criteria of a successful interviewer that enhance the success of the whole interview, as follows:

- i. Knowledgeable: through being familiar with the focus of the interview, which may be achieved by piloting the interview in advance;
- ii. Structuring the interview by clarifying the purpose of the interview and asking interviewees if they have questions;



- iii. Asking clear, simple, easy and short questions;
- iv. Being gentle, sensitive, and open with interviewees;
- v. Steering and remembering, with regard to what has been said or what he/she wants to find out; and
- vi. Being critical and interpreting by clarifying and extending meanings when needed without imposing meaning on interviewees' responses.

Bryman (2012) also acknowledges Kvale's list and adds two more criteria, as follows:

- i. Being balanced when talking in order not to disturb the path of information provided by interviewees; and
- ii. Being ethically sensitive (discussed in subsection 4.3.2.).

#### **4.3.5. Interview Types**

According to Bryman (2012) there are twelve major types of interview. Each type has features that allow the interviewer to apply the best techniques in order to achieve the main goal of the interview. However, all these types fall into the categories of structured, semi-structured, or unstructured interviews.

As the nature of this phase is to collect as much information as possible regarding the bidding situation and the most applicable factors associated with the Saudi industry for the bid/no bid decision, the interview type adopted is the qualitative interview. Bryman (2012) explains that although the term qualitative interviewing seems to denote an unstructured interview, it is more frequently a general term embracing both unstructured and semi-structured types of interviews. The justification for this is due to the features of this type, which is often used when there are different types of questions for participants from different sectors as in the present case, where the researcher applied this interview type as the most suitable type to gather the required data.

The researcher differentiates the questions objectives based on the participants sectors and field/job type. An explanation of the research, including the research aim and objectives, with the request for permission letter and a checklist of the 237 factors obtained from the literature review attached, was sent to the interviewees prior to the interview date agreed. This was intended to give the interviewees an idea about the

interview topic and contexts and allowed them adequate time to choose the appropriate factors from the checklist identified from the literature review.

#### **4.4. Analysis of Data from Qualitative Research Strand**

Bryman (2012) points out that qualitative data derived from interviews typically take the form of a large corpus of unstructured textual materials, which are not straightforward to analyse. Furthermore, unlike analysis of quantitative data, clear-cut rules about how qualitative data analysis should be carried out have not been developed; especially for semi-structured, open-ended interviews.

Approaches to qualitative data analysis can be used which categorise the interview texts, to concentrate the meanings into forms that can be presented in a relatively short space, and to work out implicit meanings of what was said. According to Kvale (1996) there are five main approaches to interview analysis:

- 1) **Meaning condensation:** this involves a reduction of large interview texts into a briefer more concise form, and involves a synopsis of the meanings spoken by the interviewees into shorter formulations;
- 2) **Meaning categorisation:** this involves the interview content being coded into categories, where long texts are reduced to simple categories such as (+) or (-), which indicates occurrence and non-occurrence of an event or trend, or to a single number, as a scale to indicate the importance of a phenomenon. In general, categorisation includes tables and figures to reduce and structure a large text;
- 3) **Narrative structuring:** this involves the sequential and social structure of a text, to bring out its meaning, and focuses on the stories told during an interview and works out their structures;
- 4) **Meaning interpretation:** this goes beyond a structuring of the obvious meanings of a text. In contrast to other techniques, it is likely to lead text expansion, and it expands meanings, as well; and
- 5) **Generating meaning through ad hoc methods:** this is a free approach, where a variety of reasonable approaches to the interview text, as well as sophisticated textual or quantitative methods, can be combined and used together to bring out

the meanings of different parts of the material. The outcome of this approach can be in words, numbers, figures, and flow charts, or in a combination of these forms.

The last method is more related to the pragmatic philosophical perspective, as it goes with what works best and can be used as evidence supporting the conclusion obtained from the data. Thus, the free approach is the selected approach for analysing the present interview data, as it is useful for the purpose of the conducted interviews, relevant for its type, and allows different qualitative data analysis methods to be applied and to emerge. Thus, the free approach also includes secondary data analysis (for the first objective of this strand, which is related to the checklist of factors), meaning condensation, and meaning categorisation methods.

Thus, bearing in mind the interview context tasks, each interview is recorded, interview transcription is applied, and interpretation of meaning is limited to when necessary. While each task of the interview context will be analysed, the selection of the most satisfactory answers of the participants' dialogue will be applied for each task. However, the following subsections will discuss the criteria for evaluating the analysis of qualitative research, as important criteria in establishing and assessing the quality of research for the qualitative strand.

#### **4.4.1. Reliability**

Reliability is one of the criteria required to assess the quality of a research study. Bryman (2012) points out that the term reliability is fundamentally concerned with issues of consistency of measures; however, this term has different meanings based on the research method applied, either quantitative or qualitative. Moreover, in the qualitative method the term reliability is concerned with external reliability and inter-observer consistency.

The external reliability in quantitative research means the degree to which a study can be replicated. However, many researches argue that such a degree is difficult criterion to be met in qualitative researches; as it is impossible to 'freeze' a social setting and the circumstances surround a study to make it replicable in the sense in which the term is usually employed. Thus, for a qualitative study, the reliability relies on the internal or inter-observer consistency. Thus, the internal reliability is concerned with the agreement

of one or more of the qualitative interview participants on what they hear and see (Bryman, 2012).

Bryman (2012) also points out that other researchers interested in the quality of qualitative researches have come up with other criteria parallel to the term reliability, such as dependability and conformability. In detail, the term dependability refers to ensuring that the researcher has adopted an 'auditing' approach, which entails ensuring that complete records are kept of all phases of the qualitative research strand, while the term conformability is concerned with objectivity by ensuring that the researcher is acting in 'good faith', in other words it should be apparent that the researcher has not overtly allowed personal values or theoretical inclinations manifestly to sway the conduct of the research and findings derived from it.

Thus, in order to guarantee the quality of this strand, records of all of the conducted interviews have been kept as an auditing approach adopted by the researcher, and acting objectively with participants' responses is recorded as well. However, the agreement among one or more participant on the findings will only be clear after presenting the findings.

#### **4.4.2. Validity**

Validity is another criterion required to ensure the quality of a research. Similarly to reliability, it has different meaning depending on the method applied for the research. For the qualitative strand of this research, Bryman (2012) points out that for qualitative interviews, there are two types of process to establish validity; internal and external validity. Internal validity, sometimes known as credibility, means that there is a good match between the research participants and the concepts or ideas they develop, while external validity, often called transferability, refers to the degree in which the findings based on the research sample can be generalised across the population.

In the present case, both internal and external validity were considered in order to ensure the quality of the qualitative strand of the research; hence, the participants of the qualitative interviews were carefully chosen based on their years of experience. Also, the participants' organisations were those that have a good reputation in their field and have achieved success in many previous projects.

## 4.5. Qualitative Research Strand Findings and Discussion

This section will present and discuss the interview findings based on the interview context aspects explained above. The contribution of these findings will help to achieve the prime research aim and objectives. Thus, by applying the free approach to generate meaning through ad hoc methods, each interview is recorded, an interview transcription is used, and any interpretation of meaning is limited to when necessary. While each task of the interview context will be analysed, the selection of the most satisfactory answers of participants' dialogue, in terms of elucidating the aspects under investigation, will be applied for each task as will be seen in the following subsections.

### 4.5.1. Factors Affecting the Bid/No Bid Decision

The first aspect of the interview context is to investigate the factors affecting the bid/no bid decision. These factors were gathered from the comprehensive literature review in order to examine their applicability from the practical point of view to the Saudi Arabian construction industry. Thus, the overall 237 factors were sent with an interview request for permission form to the interviewees prior to the interview due date to save the participants' time during the interview. The checklist included the three separate groups of factors identified in the literature chapters as follows: Group 1: Bid/No Bid Factors, Group 2: Public Private Partnership Factors, and Group 3: International Investment Factors. The participants were asked to tick the factors that they consider as the most affective towards decision-making, based on their point of view. Then, these views were then clarified and discussed in the interview. Participants were asked to justify their choices of the factors presented in the checklist as in the following examples:

**Researcher:** *“Could you please explain why you have chosen these factors in particular to be linked to your organisation’s bidding decisions, and would you like to add more factors?”*

**Interviewee (2-P):** *“All of these factors are really important and they cover everything comes in my mind, but I think these selected factors are the most important factors affecting the bid/no bid decision. Also, I would recommend to join some factors together as they belong to the same dimension. .... Honestly, these factors are effective to identify risks in general, but for every project there is a unique scenario to be analysed”.*

**Interviewee (5-PP):** *“I think this list is covering both academic and practical factors. The way I see it, it would be more accurate to divide these factors to different levels, accepting the invitation, buying the bid document, and deciding to bid. ....This list is covering many details, but I have chosen what is practically important”.*

**Interviewee (9-F):** *“This list is valuable, covering many aspects involved. I marked the factors I believe more important than others. I can say that they are not equal. Some factors will affect the decision directly more than others; for example, some factors can be critical and stop the project, such as the cash flow factor, if not secured”.*

**Interviewee (10-PD):** *“I believe risk identification is the key for success, and this list is rich in this subject. Actually these factors are fundamental and related to the practical field. ... I found some factors that must be distinguished as key factors, for instance, in some developing countries, we bought the project document but we did not bid for the project owing to the lack of convenience in the contract’s type or conditions, which is stated in the list”.*

Based on the checklist of factors, the model-input factors were reviewed after each participants’ interview and the finding of this task identified seventy-seven factors to be the most affective critical success factors that influence the bidding decisions. It is worth noting that the interview participants did not add any new factors that affect their organisations’ bidding decisions for PPP projects in the Saudi Arabian construction industry, and considered the identified checklist that includes 237 factors as a comprehensive list covered both academic and practical factors to choose from it. The level of importance of each of these factors will be examined in the next research strand, the quantitative strand. The initial list of these factors can be seen in Table 4.2.

#### **4.5.2. Policies Linking the Organisation’s Strategy with Bidding Decisions**

The organisation’s policies are the bridge that links its strategy with the decision-making process. In other words, while the organisation’s strategy needs to be translated into policies and standards to conduct activities that comply with its vision and mission, it is the role of the policies to guide actions and to determine behaviours of the organisation aligned with these policies towards making a specific decision. Thus, these policies will specify favourable conditions for achieving objectives and supporting the bidding

decision. In this section, the research is interested in exploring the favourable project conditions that will influence the organisation's policies in order to make a bidding decision. The question of this area of the interview context was delivered as a follow-up question after asking general questions regarding the bidding practices and policies, as follows:

**Researcher:** *“Could you please tell me how to express your organisation's policies on the process of decision making?”*

**Interviewee (4-PD):** *“Of course we have policies that guide our decision, the policies will help us to identify the project criteria that suites our company and we will be more confident to compete our competitors by considering them; such as our fiscal solvency, our technology submittals, and our experience with similar projects. Also, we won't decide to enter a PPP project if the client is not trusted worldwide, I mean financially and politically”.*

**Interviewee (6-PF):** *“Sometimes we receive direct invitations to bid for a project, and then our top management will arrange for a consultancy meeting with our in-house experts, and after that a decision to buy the project documents will be made. Our decision will be built on the project and client characteristics in addition to our experience with the country of the project. Also, our capability financially and competitively; and in fact, the size of the project's return will be a major reason as well. If all of these characteristics are secured then we will provide our tender”.*

**Interviewee (10-PD):** *“Our policies encourage making local alliances to achieve success; we will not enter a partnership project unless we managed to arrange for a strong consortium to exist.... We constructed some traditional projects in different Arabic countries before and we have a good idea about the situation here, our local partners are helping to save the time required for the paper work and they know how to arrange for resources. Honestly, if we did not trust that the Government is encouraging and facilitating the partnership scheme; we would not have tendered for this project”.*

**Interviewee (11-PP):** *“We have rules to guide our decision; we will analyse the bidding documents of the project and make sure that our company is prepared for such a type of*

*projects. After that the construction phase will be the main concern. .... I mean the availability of the manpower and material, supply chain and subcontractors. But in fact it is not an easy decision, as we will do a value for money study before buying the bid documents and we will discuss further details before bidding, as well. We are talking about a commitment for more than 20 years, if you know what I mean”.*

**Interviewee (12-PF):** *“The organisation’s strategy is not to bid for a mega-project if we cannot get a financial support from other partners. And the project conditions should meet our policies or we won’t bid for the project. .... The profit expected and the reputation of the country and our capability to conduct the project are major factors for our decision. The cash flow and loans, when required, are also vital aspects we considered for this type of projects”.*

The analysis of this part of the interview context detected a significant agreement on the concept itself, which is about expressing the organisation’s policies by accepting specific project criteria that influence the decision making process, either after receiving an invitation to bid or after buying the project bidding documents. However, these criteria include different factors to be considered by decision makers, and can be grouped into seven clusters, which are generated based on this part findings and with relevance to the factors identified from the literature chapter, as follows: The Contractor's Current Situation, Project Characteristics, Client Characteristics, Bidding Situation, PPP Success Factors, International Investment Success Factors, and The Tender Criteria. The research classifies the factors identified in the previous area of the interview context, factors affecting the bid/no bid decision, and allocate them according to these criteria, as depicted in Table 4.2.

#### **4.5.3. The Organisation’s Current Situation and Bidding Decisions**

The effect of the organisation’s current situation on the decision making process is an undeniable fact, but this relationship has other dimensions should be considered for accurate decisions. In this section, the research will explore the influence of situations on the bid/no bid decision. The research question was presented as follows:

**Researcher:** *“Could you please explain how the contractor’s current situation can influence the bidding decision?”*



**Interviewee (1-D):** *“Actually, as we represent the Government, it is our duty to make sure that contractors are capable for what we expect from this partnership. Thus, we request two main elements to be reviewed with their bid, first the technical side of the bidder, and then we look to the second element which is the financial side. For each element there are different criteria to be fulfilled in order to accept a contractor’s bid. For instance, in the first element we review their technical strength and their success history in similar projects, and also their continuity, which indicates the contractor’s link to contracting work without interruption. For the second element, assessing their financial situation at the end of the fiscal year and reviewing their bonds and guarantees are important steps for accepting a potential partner”.*

**Interviewee (3-F):** *“The bidders’ situation at the time when they decided to bid will be reflected positively or negatively on the negotiation meetings between the potential partners. However, most of the cases we rejected are due to the lack of strength in the financial situation of the contractor; and also they did not manage to create a strong consortium to cover their financial shortfall. In contrast to this, sometimes we invite international contractors to bid, but they do not provide a tender, due to their consideration of their situation, which is a professional decision not to bid”.*

**Interviewee (4-PD):** *“We will conduct an initial study for the project and then we will hold a meeting with our experts and discuss many issues before submitting any tender for new projects. There are many subjects that must be taken into account, such as our financial ability, liquidity, and guarantees, as well as our need for the project and our ability to implement it. In addition to our performance and our ability to comply with other projects undertaken”.*

**Interviewee (8-P):** *“It is a critical decision and there are different aspects interfering in this decision. The bidder should consult his financial experts and project managers to assess their situation and to identify risks in the project. Our job is to help any international investor before and after the contract commitment; sometimes we recommended a specific subcontractor to be included in the contract for a specific task in the project because we believe in their excellence and capability. Also, the Authority in some projects could invite an international investor and nominate some local investors*

*or contractors to create a strong consortium for the interest of the project, as a suggestion only. I am saying this to explain how a bidder could enhance his current situation”.*

**Interviewee (11-PP):** *“There are experts who will analyse the financial situation before the company decision, our project management office will deal with the matters related to the construction phase of the project. An initial study for construction requirements, risks, and expected duration will be provided to the top management before the scheduled meeting with other departments’ experts. .... Our performance and current work load with other projects will play a key factor for this decision as well”.*

The participants’ comments illustrate that identifying the organisation’s current situation is crucial for making an accurate and effective bidding decision when an investment opportunity arises. Typically, this step is accompanied by reports and expert discussions, and takes place after making sure that the potential project is suitable for the organisation’s strategy, and, of course, is aligned with its policies.

The aspects considered in the analysis of the organisation’s current situation according to the participants involved in this study can be identified as follows: the need for the project, the financial capability, the construction capability, the need for local partners, the need to form a consortium, the current performance in other projects. These aspects include further factors and barriers to be considered for the bid/no bid decision.

#### **4.5.4. Feedback on the Initial Concept of the Model**

This task of the interview context was the last main part to be discussed in the qualitative interviews. The task aims to gain practitioners views, feedback, and suggestions towards the improvement of the initial concept model, which has been adopted and developed based on the findings of Bageis (2008) study about decision making processes for traditional procurement of projects in the Saudi Arabian construction industry. Hence, in order to test its function and applicability, the initial model was presented and explained to the interviewees after gathering their information regarding the previous tasks of the interview context. The initial concept of the model is shown in Figure 4.2. Generally, this task began by asking the participants the following question:

**Researcher:** *“Bearing in mind the factors affecting the bidding decision, do you think this model’s concept prioritises the required activities needed in order to facilitate the bidding-making process?”*

**Interviewee (2-P):** *“It seems logical to me, and it could help both local and international contractors for positive decisions..... I wish to see the final model”.*

**Interviewee (4-PD):** *“I think it expresses our procedures exactly for the decision-making process. Still would like to see the final version for a better judgement”.*

**Interviewee (5-PP):** *“It is sequentially professional, but as I said before, you need to consider the three different levels before providing a tender; accepting the invitation, buying the documents, and deciding to bid”.*

**Interviewee (7-D):** *“The way I see it, this concept helps to make a rational decision. Also, the factors would help to identify risks... I am close to the RM situation of the small and medium Saudi contractors; and I think this model provides clear techniques that will help them to consider the importance of such knowledge”.*

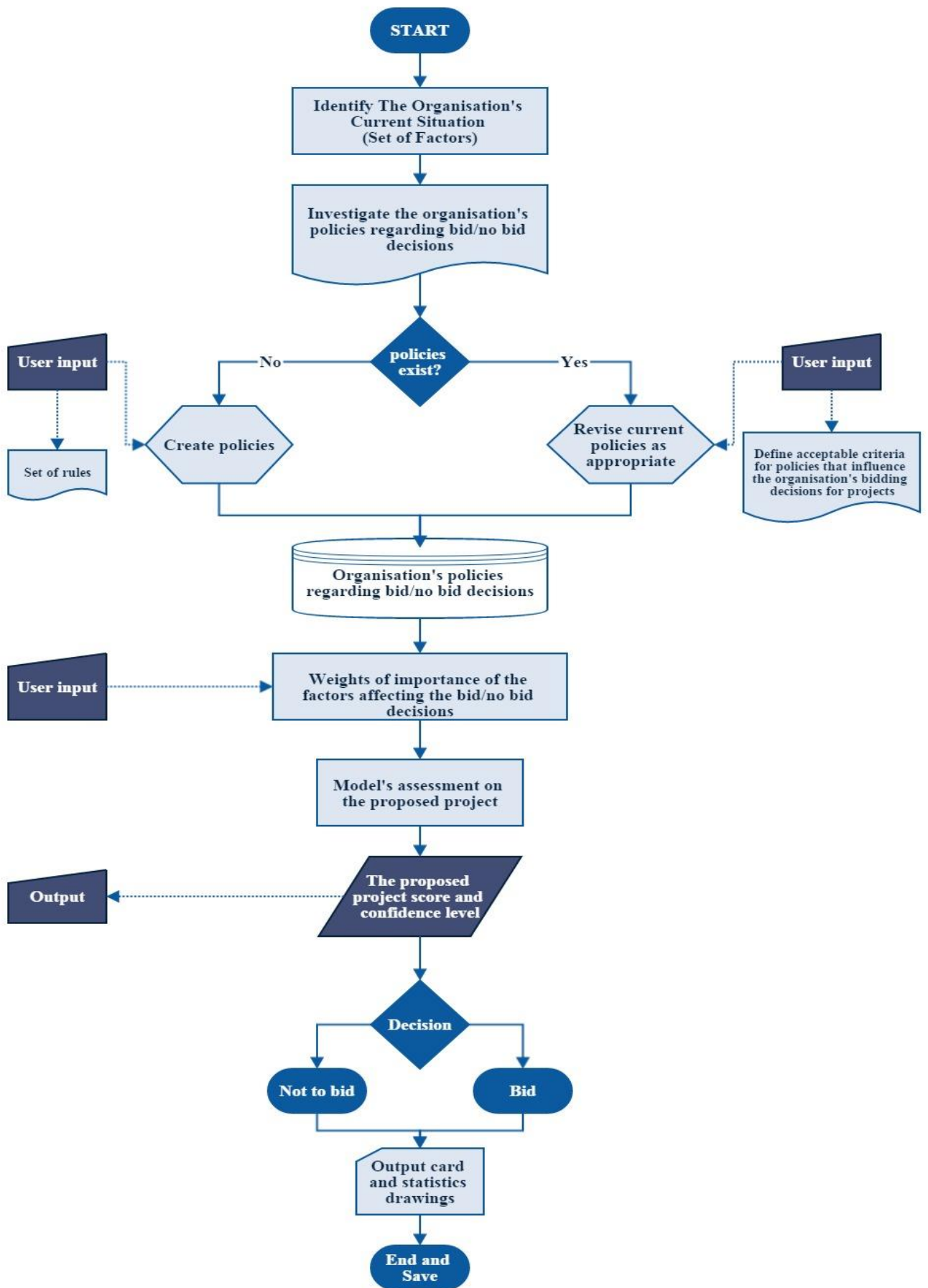


Figure 4.2: Initial Concept of the Model

Positively, the concept of the initial model was supported by the interview participants; their recommendations and suggestions will be carefully considered. Largely, there was agreement on the model's functions, where setting the priorities in the model's systematic processes are built on a rational basis. The participants' suggestions emphasise adopting three different levels as the path of the decision-making process before bidding in order to express a realistic scenario of an organisation looking for an investment opportunity. These three levels are: accepting the invitation to bid, buying the bidding document, and deciding to bid or not to bid. The participants' further suggested that the analysis of the organisation's policies, the project evaluation, and the organisation's current situation assessment should be conducted for each level. The final concept and web-based design of the model will be presented and discussed in Chapter 7.

#### **4.6. Summary of Chapter Four**

In brief, this chapter has confirmed the findings of the literature reviews in terms of the importance of the research aim and objectives the need for such a decision model to address international investors' bidding decisions from the perspective of risk management for PPP projects in Saudi Arabian construction industry.

The interviews were conducted with local and international expert personnel working in the Saudi construction industry from both public and private sectors. The findings distinguished the most applicable factors, from those initially collected from the literature review, to be adopted in the model-input and which suit the Saudi construction industry. This resulted in seventy-seven factors to be examined and ranked in the questionnaire survey. Also, the interview findings provide a rich insight into the practical situation of the decision-making processes. The interviews highlighted the importance of the research topic, and the interviews findings, based on the interview context tasks, can be summarised in the following points:

- ✚ The findings emphasise that the careful project selection is a key success strategy for the whole project success;
- ✚ The findings indicate that technical and financial evaluation of the project are a vital steps for rational and successful bidding decisions;

- ✚ Risk identification techniques are the path to achieve project's success in order to be 'armed' and prepared for 'unhappy surprises';
- ✚ The findings also point out that the problem of poor bid/no bid decisions exists and some projects have been changed to the traditional procurement route; for example, the north-south railway network project;
- ✚ The findings emphasise that the decision making process and the evaluation of factors that affect bid/no bid decisions should be based on the organisation's current situation, strategy, and policies, for accurate and effective decisions that fit the organisation's capability and capacity. This supports the relevance of the research problem and the need for a strategic risk management decision model for PPP projects in the Saudi industry to enhance the effectiveness of the international contractors' bid/no bid decisions;
- ✚ The findings suggest that some factors can be merged together as one factor for best results from the model-input, for example, the political factors can be included in the cluster of international investment factors; rather than repeating the same factors in other clusters;
- ✚ Some critical factors are interfering and interacting with other critical factors from another cluster, for example, some factors of the bid/no bid decision cluster interfere with other factors from the PPP and/or the international investment cluster. Thus, there is no need to repeat them again in the same model-input when considered in one cluster;
- ✚ The findings thus generate a revised and combined set of factors, in particular, seventy-seven factors that have a potential influence on the bid/no bid decision and should therefore be examined in the questionnaire survey and then be used in the model construction phase. The factors and their categories can be seen in the following table (Table 4.2);
- ✚ The findings point to the fact that there are certain factors which are more important and more critical than others, in other words, some factors can directly affect the result of the decision; and
- ✚ It is worth noting that the interview participants did not add any new factors that affect their organisations' bidding decisions for PPP projects in the Saudi Arabian construction industry, and considered the identified checklist that includes 237 factors as a comprehensive list covered both academic and practical factors to choose from it. The level of importance of each of these factors will be examined in the next research strand, the quantitative strand.

**Table 4.2: Factors Affecting Bid/No Bid Decisions**

Code	Category	Factor Description
F1	<b>The Contractor's Current Situation</b>	Considering the need for a new project
F2		Considering the organisation's current workload
F3		Considering the organisation's current projects' performance
F4		Considering the condition of labour availability
F5		Considering the organisation's financial situation
F6	<b>Project Characteristics</b>	Considering the level of acceptance of the project's size in Saudi Riyals
F7		Considering the location of the project
F8		Compatibility of the organisation's type of work with the type/nature of the project
F9		Considering the level of acceptance of the project's duration
F10		Considering the past experience with similar projects
F11		Considering the benefits expected in terms of the renewal stage of the classification certificate after conducting the project
F12	<b>Client Characteristics</b>	Considering the client's financial capacity
F13		Considering the ability of the client to provide a financial guarantee
F14		Considering the client's reputation
F15		Considering the previous experience with the client if existed
F16		Consideration of other potential projects available from the same client
F17		Considering the easiness of obtaining project payments from the client
F18	<b>Bidding Situation</b>	Level of acceptance of the bid document price
F19		Sufficiency of time remaining to submit the bid
F20		Considering the expected competitors before entering the bid
F21		Considering the classification degree required to enter the bid
F22		Considering the scope of work required to enter the bid
F23		Availability of the required performance security (bond & guarantee)
F24		The expected chance of winning the bid
F25		Considering the early implementation of partnering relationship
F26	<b>PPP Success Factors</b>	Considering the adoption of an effective procurement route to conduct the project
F27		Unifying a specific vision with partners
F28		Level of commitment of partners
F29		Consideration of applying open communication and trust between partners
F30		Willingness of partners to compromise and collaborate
F31		Level of respect between partners
F32		Taking into consideration the community outreach
F33		Considering the accessibility of political support and facilitation in the targeted country
F34		Considering the adoption of local and global expert advice and review for the proposed project in the targeted country
F35		Considering risk awareness in general for the proposed project and the targeted relationship
F36		Taking into consideration the condition of clear rules and determined responsibilities between partners
F37		Considering the application of monitoring the partnering processes

F38		Taking into consideration local and/or global subcontractors' involvement for conducting the proposed project
F39		Considering the innovation capability in the targeted relationship
F40		Considering the availability of a conflict resolution strategy for the targeted relationship
F41	<b>International Investment Success Factors</b>	Considering the economic stability of the targeted country of project
F42		Consideration of predictable political risks of the country such as visa restrictions and customs constraints
F43		Consideration of the financial risks of the country (including exchange rate fluctuations, inflation, interest rate fluctuations and taxes)
F44		Considering the prevailing climatic/geographical conditions of the target country of operation
F45		Considering the use of local management and staff, the formation of joint ventures and/or consortia, or the use of local agents, local sponsors or facilitators in the target country
F46		Understanding the cultural variables allied with all project stakeholders; and the adaptation of new management skills and techniques in order to accommodate them
F47		Understanding the different legal systems that are in operation in the target country; for Saudi Arabia it is Islamic and customary law practices
F48		Evaluation of the client's negative characteristics in the target country, such as late payment, corruption, delays in approvals and permits, and government bureaucracy and poor infrastructure
F49	<b>Tender Criteria</b>	The type of contract for the project is recognised worldwide
F50		Level of acceptance of the contract conditions
F51		The accuracy of bill of quantity provided by the client
F52		The accuracy of the original cost estimated by the client
F53		Clarity of the work and specifications needed for the project
F54		Clarity of quality scope required for the project
F55		Level of completeness of project's design
F56		The accuracy of the cost estimated by the contractor
F57		Degree of possible alternative design to reduce the project cost if allowed
F58		Considering the possibility of additional work needed for fulfilling the project
F59		Considering the use of nominated subcontractors requested by the client
F60		Considering safety hazards
F61		Level of availability of resources and manpower
F62		Supply chain management consideration
F63		Level of familiarity with site condition
F64		The project information is sufficient
F65		Reputation of the management consultant appointed by the client
F66		Considering the project management system required to conduct the project
F67		Considering the project supervision procedure for the targeted relationship
F68		Considering the Governmental division requirements
F69		Considering the adequacy of advance payment provided by client if existed
F70		The availability of work-capital required to start the project
F71		The project's cash flow is secured
F72		Considering general office overhead



F73		Considering the ease of obtaining a bank loan if needed
F74		Degree of satisfaction on the expected profit
F75		The benefits expected in terms of general relationship
F76		The organisation is capable of conducting the project
F77		The project matches the organisation's strategy and future vision

## **CHAPTER 5: QUANTITATIVE RESEARCH STRAND – DESIGN AND RESULTS**

### **5.1. Introduction**

Having discussed the second phase of the research design, the Qualitative Research Strand, the next step required for achieving the research aim and objectives is to describe and analyse the procedure followed for data collection in phase three, the Quantitative Research Strand, which was conducted through a quantitative questionnaire-based survey to examine only the returned factors from phase two, as the most applicable factors to the Saudi Arabian construction industry. In order to use these for designing the web-based model, a ranking order for these factors should then be obtained, based on their level of importance to the Saudi industry. This chapter will present the design and descriptive results of the quantitative questionnaire survey, while the analysis and discussion of the results will follow in the next chapter.

The purpose of data collection in mixed methods research is to develop answers to the research questions (Teddlie and Yu, 2007). This phase was constructed as a quantitative research strand as the best possible route to accomplish the following objectives:

- To investigate the link between organisations' RM practice and decision-making processes;
- To investigate the need for a rational RM strategic decision model for PPP projects;
- To investigate the level of importance of the factors affecting the investment decision, and then to rank them according to their importance to the contractor organisations; and
- To examine and distinguish different behaviours in the process of decision-making of contractor organisations according to their differences in terms of the contractor organisations' classification status, size, type of the main client, and the type of work.

## **5.2. Data Collection under the Quantitative Research Strand**

According to Blaxter *et al.* (2001), quantitative survey questionnaires are one of the most widely used social research techniques, as researchers design them to involve specific written questions for respondents, whose opinions and experiences are essential to address the interest area of the researcher. They also explain that although using questionnaires seem to be an obvious strategy for finding answers to the issues that interest a researcher, it is not such a simple task as it might seem. This method therefore needs special care not only in the questionnaire design, but in the administration, as well.

Regarding the questionnaire design, Fellows and Liu (2008) explain that questions can be posed in two primary forms, open or closed. Although open questions enable respondents to answer in full detail and to reply in whatever form they choose, such questions are difficult answer in that the answer may never be fully comprehensive and the answers are often very difficult to analyse. On the other hand, closed questions have a set number of responses, help in saving respondents time, and are easier to be analyse. Based on these considerations, the researcher adopted the quantitative closed-ended questions when formulating and wording the questionnaires.

Regarding the administration, there are three different ways through which questionnaires can be administered: a postal questionnaire, personal administration, which includes the researcher or field assistants or over the telephone or face-to-face, and fax and over the internet questionnaires (Blaxter *et al.*, 2001). Also, they point out that there are advantages and disadvantages for each of these methods. For instance, postal, fax, and email surveys, are likely to have lower response rates and possibly poorer answers because the respondent has no one available to answer any queries in addition to the possibility of there being incorrect or missing data, but they may allow a larger number of people to be surveyed. In contrast, although face-to-face surveys are more time consuming for the researcher, they may get a better response rate and high quality answers. Thus, face-to-face administration approach was applied.

### 5.3. Structure of the Questionnaire

Bearing in mind the research aim and objectives, the questionnaire, which can be seen in Appendix B, is designed in three parts as follows:

**Section 1** is designed to gather information regarding the participants' organisations in terms of the following characteristics: classification status, types of work, annual business volume, and types of clients. This section aims to classify the participants according to their characteristics, and then, to distinguish the questionnaire results based on these different characteristics in order to examine and distinguish different behaviours in the process of decision-making of contractor organisations.

**Section 2** is designed to investigate the participants' opinions and practices regarding project selection procedures. This section focuses on the following aspects: the importance attached to project selection, the existence of project evaluation, risk identification methods, the level of maturity of risk management in participants' organisations, the need for a decision model and the areas to be covered by the desired model, and the contribution of models to project success. In particular, this section will help to achieve the following objectives: to investigate the link between organisations' RM practice and decision-making processes, and to investigate the need for a rational RM strategic decision model for PPP projects.

**Section 3** is designed to determine and rank the level of importance of the factors that could affect bid/no bid decisions in the Saudi Arabian construction industry. The seventy-seven factors are presented with a scale for weight of importance from 1 to 10, where 1 is the lowest level of importance and 10 the highest level of importance. Also, the factors are presented in seven clusters, to link each set of factors under a specific category. In addition, the participants are asked to add any other potential factors that could affect the bidding decisions to be considered in the study and in the construction phase of the desired model.

## **5.4. Sampling**

For any research project, it is an essential step to choose the study sample of population (Marshall, 1996; Bryman, 2012). Moreover, one of the most important features to distinguish what is commonly referred to as qualitative from quantitative inquiry is the type of sampling type used. While qualitative research typically involves purposeful sampling to enhance understanding of the information-rich case, quantitative research ideally involves probability-based sampling to permit statistical inferences to be made (Patton, 1990; Sandelowski, 2000).

Sandelowski (2000) explains that purposeful sampling is oriented toward the development of idiographic knowledge from generalisations from and about individual cases, while probability sampling is oriented toward the development of nomothetic knowledge, from generalisations from samples to populations. Notwithstanding these key differences, purposeful and probability sampling techniques can be combined usefully.

Thus, according to Sandelowski (2000), there are three main sampling approaches that can be used for mixed-method research as follows:

- 1) Criterion sampling: this is a kind of purposeful sampling of cases on preconceived criteria, in which the use of quantitative techniques precede the use of qualitative techniques. This type of sampling may also be referred to as typical case sampling.
- 2) Random purposeful sampling: this type of sampling can be employed when there is a very large pool of potentially information-rich cases and no obvious reason to choose one case over another.
- 3) Stratified purposeful sampling: is a non-probability type, used purposefully when the researcher wants to ensure that certain cases which vary on preselected parameters are included.

### **5.4.1. Sample Selection**

Having identified the main types of sampling, the next step is to choose the best type to fulfil the research aim and objectives, to select the sample needed, and to find the appropriate/required sample size of the population. As the PPP scheme to conduct projects can be considered as an immature scheme in the Saudi Arabian construction

industry, and a very small number of projects have so far implemented in this method, the researcher sought advice on this issue from the Saudi Arabian General Investment Authority (SAGIA), when they were involved in the interviews in the previous chapter.

SAGIA clarified that, for PPP projects in Saudi industry, they motivate local and/or international contractor organisations who wish to invest in PPP projects to set up a strong technical and financial consortium made up of several business companies for a better chance of success under concrete sharing contracts. If this is the case, but it is not a must, as a single and technically and financially strong organisation can bid alone, SAGIA has the following rules: (i) PPP projects are currently available only for the construction type of works; (ii) the bidder must be classified, this includes all of the organisations involved in the consortium; (iii) the classification degree must be between 1 and 3 and depends on the targeted project, which means that the annual business volume must be over 5 Million Saudi Riyals for each organisation involved in the consortium or for the main contractor, if there is no consortium needed.

Consequently, after considering SAGIA rules and based on the records of the Ministry of Municipal and Rural Affairs, and the contractors' classification deputy in particular, it was found that there are 12,017 local and/or international classified contractor organisations working in the Saudi industry; and a very small number, six large contractor organisations in particular, amongst the other classified organisations have participated in PPP projects in the Saudi Arabian construction industry. However, the number of unclassified contractor organisations is much greater, as the construction sector can be considered as one of the main sectors in Saudi Arabia. Thus, only contractor organisations working in construction types of work, which are classified, and have an annual business volume over 5 Million Riyals have potential chances to bid for PPP projects.

Based on this information, the researcher decided to apply the random-purposeful sampling type; as the best technique of sampling that could help to fulfil the research aim and objectives. This type of sampling is an important procedure in such survey research studies, as it belongs to the probability assumption frame, and the findings derived from a sample size commensurate to the overall population can be generalised (Bryman, 2012).

### 5.4.2. Sample Size and Error

The target population was identified from the Saudi Ministry of Municipal and Rural Affairs list of contractors, where the total number of classified contractors was 12,017, as mentioned above. Hence, the required size of the sample was determined by using the following formula: (Kish, 1965).

$$n = n_0 / (1 + n_0 / N) \quad \text{Equation (1)}$$

Where  $n$  is the sample size,

$n_0$  is the representative sample for proportions =  $S^2/V^2$ ,

$N$  is the total population = 12,017 classified contractors,

$S$  is the maximum standard deviation in the population elements at total error = 0.1 with a confidence level of 95%,  $\Rightarrow S^2 = (P)*(1-P)$ ,

$P$  is the estimated proportion of population elements that belong to the defined class = 0.5

$\Rightarrow S^2 = (0.5) (0.5) = 0.25$  and

$V$  is the standard error of sampling distribution = 0.05  $\Rightarrow V^2 = 0.0025$ .

Thus,  $n_0 = S^2/V^2 = 0.25/0.0025 = 100$

$$\Rightarrow n = \frac{100}{1 + \frac{100}{12,017}} = 99.2$$

Based on the procedure in Shash and Abdul-Hadi's (1993) study, the predefined variables and their identified values are substituted and a sample size of  $n = 99.2$  is arrived at the minimum required sample size to fit the targeted population. However, during a three months field trip, with the help and support provided by both SAGIA and The Saudi Council of Engineers, the study was conducted with 120 expert personnel under face-to-face administered approach questionnaires, with a 100% response rate.

## **5.5. Piloting the Survey**

Bryman and Bell (2003) points out that to enhance the validity of questionnaires it is advisable to complete a pilot study that will be helpful for assessing wording of questions, identifying ambiguous questions, and testing the questionnaire technique that has been used. Other advantages gained from conducting a pilot study include the awareness of the time needed by respondents to complete the questionnaire, the awareness of the clarity of questions and instructions, the awareness of the attractiveness of the layout, and the access to important comments.

Because of these advantages, a pilot study was conducted prior to conducting the main questionnaire in the Saudi Arabian construction industry, in order to examine the validity and clarity of the questions and factors included. The respondents of the pilot study were carefully chosen in order to achieve the aim the pilot study. Hence, the nominated respondents were four professional personnel working in the Saudi Arabian construction industry who had been involved in many projects: two of them were full-time project managers and one was working as a general manager, while the last one was working as a finance manager, with minimum of six years of experience for each of them.

The results achieved from the pilot study were highly important and helped to improve the clarity and structure of the questions. Moreover, the results have given the researcher more confidence in the relevance of the questionnaire survey in its context. The feedback gained was very useful to support the aim of the research. Thus, some modifications were applied to the questionnaire design, in terms of the terminology used in the survey.

## **5.6. Data Analysis**

The returned face-to-face quantitative questionnaires were carefully coded, labelled, and categorised in order to be analysed by using quantitative data analysis methods. The quantitative analysis was then carried out by using the SPSS (Statistical Package for the Social Sciences) software. SPSS is a powerful statistical package software that helps to make accurate analysis and decisions with high value data preparation, analytical reports (include tables, figures, and charts), and modelling (Pallant, 2011). Thus, the SPSS



analysis software was applied to present the results and analyse the findings of this quantitative phase of the research.

### **5.6.1. Reliability and Validity Tests**

Reliability and validity tests are criteria for judging the quality of the research design (Yin, 2009). Bryman (2012) explains that reliability refers to the consistency of a measure of a concept, whereas validity refers to the issue of whether an indicator or set of indicators that is devised to gauge a concept really measure the concept.

More clearly, Yin (2009) elucidates four tests that have been commonly used to establish the quality of any empirical social research as follows:

- 1) Construct validity: involves identifying the correct operational measures for the concepts being studied,
- 2) Internal validity: entails establishing a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships. But, this test is applicable for explanatory or causal studies only, and not for descriptive or exploratory studies.
- 3) External validity: involves defining the domain in which a study's findings can be generalised, and
- 4) Reliability: has to do with demonstrating that the operations of a study, such as the data collection procedures, can be repeated with the same results, where the goal is to minimise the errors and biases in the study.

Both Trochim (2001) and Bryman (2012) emphasise that both reliability and validity are important and need to be considered throughout the whole research. They also, they explain that prominent factors such as stability and internal reliability should be involved when considering a measure is reliable, where stability entails asking whether a measure is stable over time, and internal reliability is about determining whether respondents' scores on any one indicator tend to be related to their scores on the other indicators.

The focus in the assessing stability and internal consistency is through its most commonly used indicator, namely Cronbach's alpha coefficient. In the present research, reliability tests were run on SPSS for Cronbach's alpha coefficient to demonstrate the reliability of the questionnaire survey regarding the ranking of the factors affecting the bid/no bid decision in Section 3 of the questionnaire. This coefficient should be more than 0.7 to confirm a high level of the reliability (Chan, 2005, Pallant, 2011).

**Table 5.1: Reliability Statistics**

<b>Reliability Statistics</b>	
<b>Cronbach's Alpha</b>	<b>N of Items</b>
<b>.902</b>	<b>77</b>

The Cronbach's alpha coefficient in this study presented a value of 0.902, as shown in Table 5.1 for the seventy-seven variables tested. This indicates a high level of stability and internal consistency; therefore, it can be concluded that the instruments used for the research design are significantly reliable.

Unlike the reliability, the validity test is relatively contentious, as there is not an agreed coefficient or equation to demonstrate an objective assessment or value. However, Trochim (2001) and Awodele (2011) advocate that the validity of a measuring instrument can be ensured by piloting the questionnaire before administering it to respondents in a real survey. Thus, the pilot study of the questionnaires, as described above, ensured the validity of the research instrument used under this strand of the study.

### **5.6.2. Normality**

When analysing differences between groups or categories using parametric tests, such as one-way ANOVA, a common assumption in all these tests is that the dependent variable is approximately normally distributed for each group or category of the independent variable. In this research, the independent variables 'categories' are the organisations' classes, whereas the dependent variables are the factors affecting the bid/no bid decision. According to Pallant (2011) there are two broadly used methods for assessing normal distribution of tested variables: (i) by using numerical methods, such as statistical tests, and/or (ii) by using graphical methods, such as visual inspection of graphs.

Moreover, as explained by Pallant (2011), SPSS can run all of these numerical and graphical methods for assessing normality, and, for statistical tests where there are over 50 participants, the Kolmogorov-Smirnov test (often called the K-S test) is a dedicated test for normality, where the significance value for this test (Sig.) should be greater than .05, to indicate that the assumption of normality has not been violated. The output of this test is included in the tests of normality table in SPSS, as shown below in Table 5.2.

Graphical methods involve the visual assessment of the histogram and normal Q-Q and detrended normal Q-Q plots to reveal whether the theoretical frequency distribution for a set of variable data has a normal distribution or has a non-normal distribution, based on each variable's Mean ( $\mu$ ) and Standard Deviation ( $s$ ). Although graphical interpretation has the advantage of allowing the researcher to use his or her own judgement to assess whether there is normality in a given situation, this comes at the expense of objectivity, as personal judgement is involved (Pallant, 2011).

Normality tests were run using the Kolmogorov-Smirnov test in SPSS, and the results show that all of the variables scored significance values ( $p$ ) less than .05, which means that the distribution of the dataset is non-normal. However, it is quite common to have a violation in the normality assumption of the dataset distribution for research studies with large samples or numbers of participants (Pallant, 2011).

**Table 5.2: Test of Normality**

Tests of Normality							
Kolmogorov-Smirnov <sup>a</sup>							
Factors	Statistic	Df	Sig.	Factors	Statistic	df	Sig.
F1	.107	120	.002	F40	.246	120	.000
F2	.133	120	.000	F41	.197	120	.000
F3	.161	120	.000	F42	.170	120	.000
F4	.173	120	.000	F43	.217	120	.000
F5	.196	120	.000	F44	.149	120	.000
F6	.170	120	.000	F45	.194	120	.000
F7	.192	120	.000	F46	.146	120	.000
F8	.176	120	.000	F47	.126	120	.000
F9	.211	120	.000	F48	.183	120	.000
F10	.216	120	.000	F49	.390	120	.000
F11	.133	120	.000	F50	.260	120	.000
F12	.134	120	.000	F51	.167	120	.000
F13	.157	120	.000	F52	.206	120	.000
F14	.139	120	.000	F53	.204	120	.000
F15	.125	120	.000	F54	.167	120	.000
F16	.129	120	.000	F55	.132	120	.000
F17	.133	120	.000	F56	.198	120	.000
F18	.140	120	.000	F57	.146	120	.000
F19	.149	120	.000	F58	.140	120	.000
F20	.118	120	.000	F59	.155	120	.000
F21	.113	120	.001	F60	.156	120	.000
F22	.196	120	.000	F61	.217	120	.000
F23	.140	120	.000	F62	.176	120	.000
F24	.141	120	.000	F63	.155	120	.000
F25	.132	120	.000	F64	.350	120	.000
F26	.160	120	.000	F65	.206	120	.000
F27	.185	120	.000	F66	.228	120	.000
F28	.167	120	.000	F67	.202	120	.000
F29	.196	120	.000	F68	.172	120	.000
F30	.189	120	.000	F69	.164	120	.000
F31	.160	120	.000	F70	.203	120	.000
F32	.150	120	.000	F71	.371	120	.000
F33	.185	120	.000	F72	.197	120	.000
F34	.185	120	.000	F73	.205	120	.000
F35	.196	120	.000	F74	.157	120	.000
F36	.249	120	.000	F75	.171	120	.000
F37	.157	120	.000	F76	.403	120	.000
F38	.148	120	.000	F77	.406	120	.000
F39	.168	120	.000				

a. Lilliefors Significance Correction

## 5.7. Results of the Questionnaire Survey

In this section, the general descriptive statistics for the questionnaire survey will be presented, while further statistical analysis and discussion will follow in the next section.

### 5.7.1. Results of Section One: About Your Organisation

The main purpose of this section is to gather information about each participant's organisation, related to the organisation's classification status, type of work, annual business volume, and main client type. This section includes four questions and their general statistics are shown in the following table.

**Table 5.3: Section One: General Statistics**

Statistics					
		Classification	Work Type	Annual Volume	Main Client
N	Valid	120	120	120	120
	Missing	0	0	0	0

With no missing responses, as can be seen in the above table, the descriptive statistics for these four questions are as follows:

**Q. 1.1:** The target of this question is to determine the organisation's classification situation for each respondent in order to investigate any differences between the respondents in terms of these characteristics. The question is presented as shown below, in Figure 5.1, followed by the results for this question in Table 5.4.

<b>Section 1: About Your Organisation</b>					
<b>1-1 Contractor's classification</b>					
A- Classified		<input type="checkbox"/>	B- Not classified		<input type="checkbox"/>
If classified, please write down your classification number					<input type="checkbox"/>

**Figure 5.1: Question 1-1 of the Questionnaire Survey**

**Table 5.4: Question 1-1 Contractor's Classification**

Classification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<b>Classified</b>	120	100.0	100.0	100.0

From the output shown above, it is clear that all of the 120 participants' organisations are classified (100%).

**Q. 1-2:** The target of this question is to determine the organisation's type of work, for each respondent, in order to investigate any differences between the respondents in terms of their main job. The question is presented as shown in Figure 5.2 and the result for this question is presented in the Table 5.5, which shows that all the participants' organisations were engaged in construction work.

<b>1-2 Contractor's type of work</b>													
A- Construction work				<input type="checkbox"/>	B- Maintenance work				<input type="checkbox"/>				

**Figure 5.2: Question 1-2 of the Questionnaire Survey**

**Table 5.5: Question 1-2 Contractor's Type of Work**

Work Type					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<b>Construction</b>	120	100.0	100.0	100.0

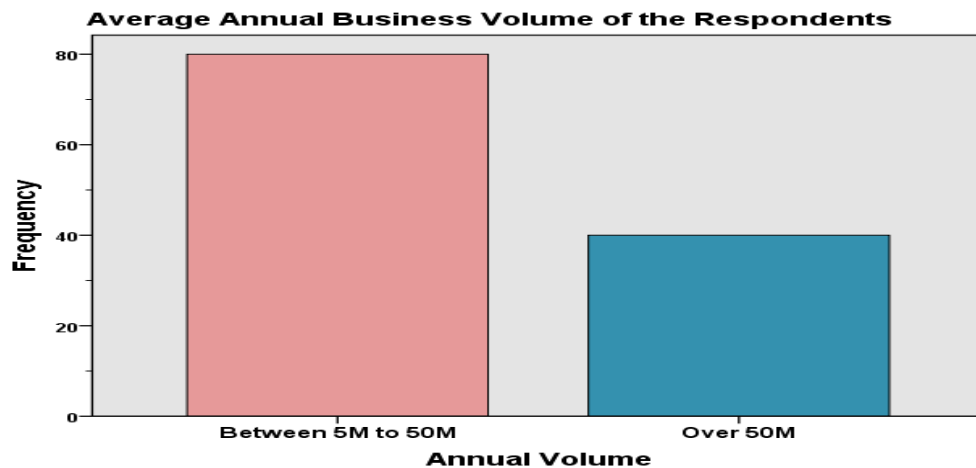
**Q. 1-3:** The target of this question is to identify the annual business volume of the participants' organisations, in order to distinguish any differences in their responses. The question, as presented in the questionnaire survey, is shown in Figure 5.3 and the results in Table 5.6.

1-3 Contractor's annual business volume (by Millions in Saudi Riyals)					
A- Under 5 M	<input type="checkbox"/>	B- Between 5 M to 50 M	<input type="checkbox"/>		
C- Over 50 M	<input type="checkbox"/>				

**Figure 5.3: Question 1-3 of the Questionnaire Survey**

**Table 5.6: Question 1-3 Contractor's Annual Volume**

Annual Volume					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Between 5M to 50M	80	66.7	66.7	66.7
	Over 50M	40	33.3	33.3	100.0
	<b>Total</b>	120	100.0	100.0	



**Figure 5.4: Average Annual Business Volume of the Respondents**

As the Table 5.6 and Figure 5.4 shows, there are eighty respondents with annual business volume between 5 Million to 50 Million which is 66.7% of respondents, while there are forty respondents with annual business volume of more than 50 Million, which is 33.3% of respondents.

This question will be used to classify participants' organisations based on their turnover size as follows: (i) Medium contractors' organisations with annual business volume between 5 to 50 Million, and (ii) Large contractors' organisations with annual business volume more than 50 Million.

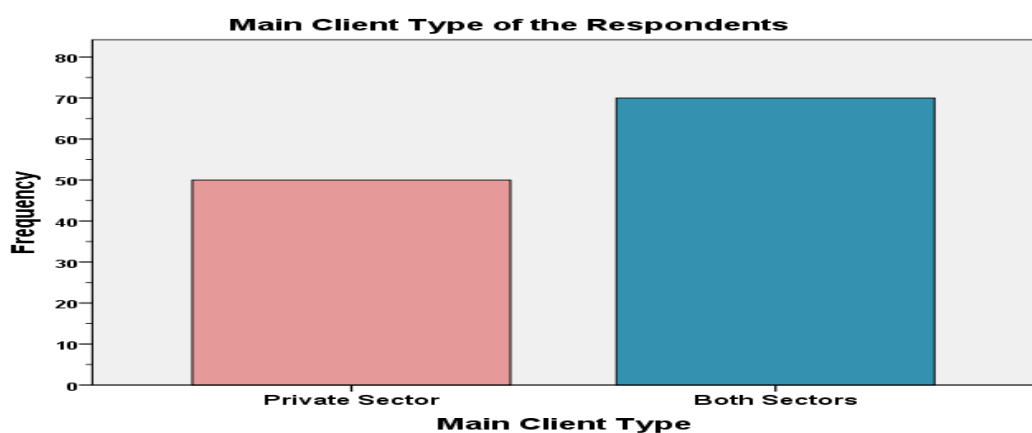
**Q. 1-4:** The target of this question is to identify the main client type of each participant's organisation, in order to distinguish any differences in their responses. Figure 5.5 shows the question as presented in the questionnaire survey and Table 5.7 shows the responses, while the main client type is shown in Figure 5.6.

1-4 Contractor's main client is	
A- Public sector	<input type="checkbox"/>
B- Private sector	<input type="checkbox"/>
C- Both sectors	<input type="checkbox"/>

**Figure 5.5: Question 1-4 of the Questionnaire Survey**

**Table 5.7: Question 1-4 Contractor's Main Client Type**

Main Client Type					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private Sector	50	41.7	41.7	41.7
	Both Sectors	70	58.3	58.3	100.0
	<b>Total</b>	120	100.0	100.0	



**Figure 5.6: Main Client Type of the Respondents**



The results above show that the largest number of respondents, (58.3%) are from organisations dealing with both public and private sectors, while only 41.7% of the respondents are from organisations whose main clients belong to the private sector. This question will be used to classify participants' organisations based on their main client type for further analysis discussion in the next section.

### 5.7.2. Results of Section Two: Project Selection Procedures

The main purpose of this section is to investigate contractor organisations' procedures and techniques for project selection with respect to their risk management maturity level and finally investigating the need for a decision model and what such a model should consider to achieve success in project selection. This section contains seven questions, and their general statistics are shown in the Table 5.8.

**Table 5.8: Section Two General Statistics**

Statistics								
		P.S. Importance Level	Pre-Bidding Evaluation	Pre-Bidding Risks Identification	Org. RMML	Necessity of Using Model	Necessity of Covering Risks	Model Contributes to Success
N	Valid	120	120	120	120	120	120	120
	Missing	0	0	0	0	0	0	0

With no missing responses, as can be seen in the above table, the descriptive statistics for the seven questions are as follows:

**Q. 2-1:** To investigate the respondents' point of view regarding the importance of the project selection stage to project success in general. This question was presented to the participants in a ranking scale form, where the scale starts from 1 which means unimportant to 5 as very important, as shown in the Figure 5.7 and the results and statistics are presented in Tables 5.9 and 5.10, and in Figure 5.8.

<b>Section 2: Project Selection Procedures</b>									
<b>2-1 How important is the project selection to the whole project's success?</b>									
Please write a scale number from 1 to 5, where 1 is unimportant and 5 is very important									<input type="text"/>

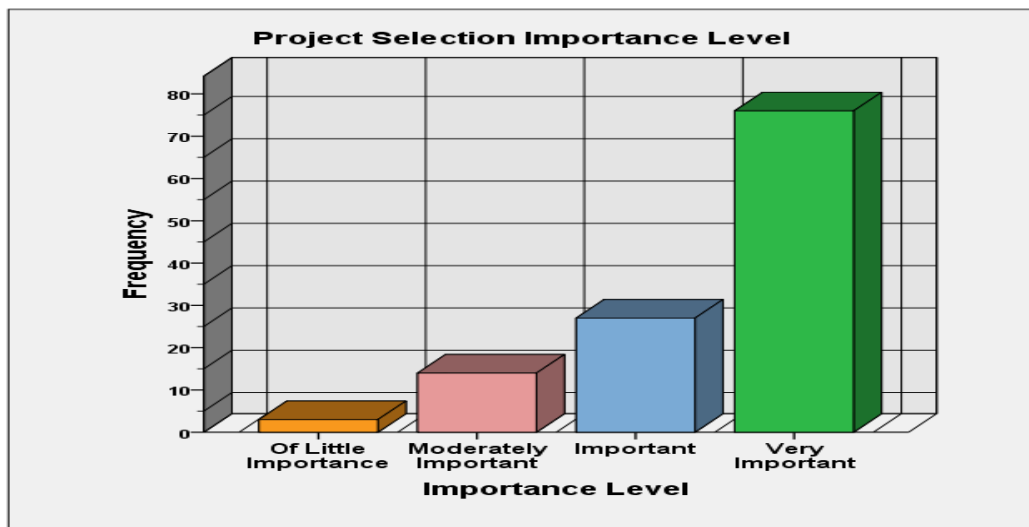
**Figure 5.7: Question 2-1 of the Questionnaire Survey**

**Table 5.9: Question 2-1 Project Selection Importance Level**

Project Selection Importance Level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Of Little Importance	3	2.5	2.5	2.5
	Moderately Important	14	11.7	11.7	14.2
	Important	27	22.5	22.5	36.7
	Very Important	76	63.3	63.3	100.0
	<b>Total</b>	120	100.0	100.0	

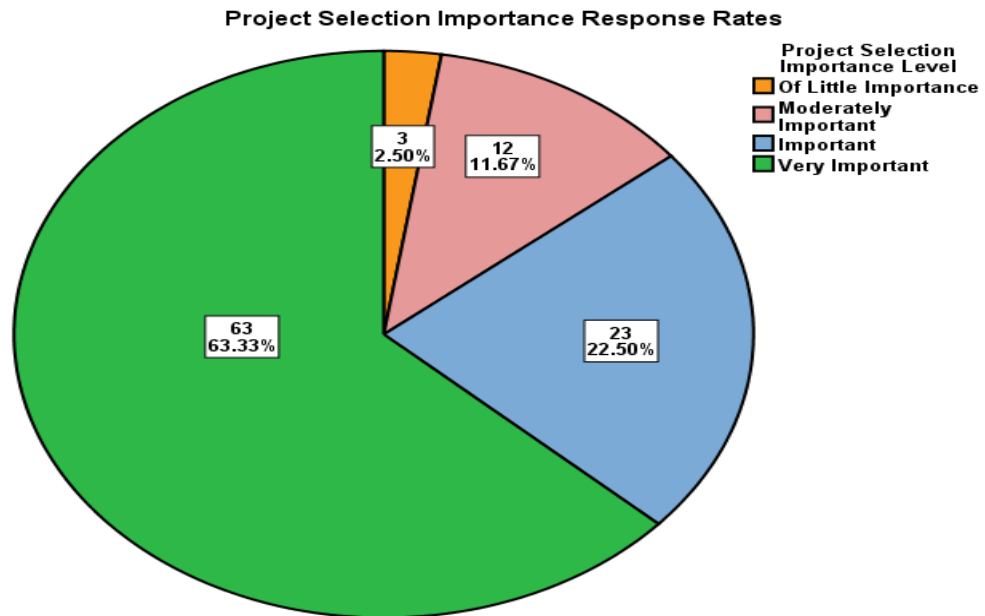
**Table 5.10: Question 2-1 Statistics**

Statistics: Project Selection Importance Level								
N	Valid	120	Mean	Std. Deviation	Variance	Range	Minimum	Maximum
	Missing	0	4.47	.798	.638	3	2	5



**Figure 5.8: Project Selection Importance Level**

From the output shown above in Table 5.9, it can be seen that although three respondents (2.5%) indicated that project selection is of little importance and fourteen (11.7%) agreed that it is moderately important, no respondent indicated that project selection is not important. On the other hand, the great majority of respondents (85.8%) emphasised the importance of project selection stage to the whole project success, twenty-seven respondents (22.5%) ranking it as important, while seventy-six (63.3%) considered it as very important. This result helps to confirm the importance of the selection process and need for this research, which is also evident from the mean value ( $\mu=4.47$  out of 5) shown in Table 5.10.



**Figure 5.9: Project Selection Importance Response Rates**

**Q. 2-2:** To investigate whether the participants evaluate their potential projects after the invitation and before deciding to bid or not. This question was presented to the participants as shown in the Figure 5.10 and the results are shown in Table 5.11 and Figure 5.11.

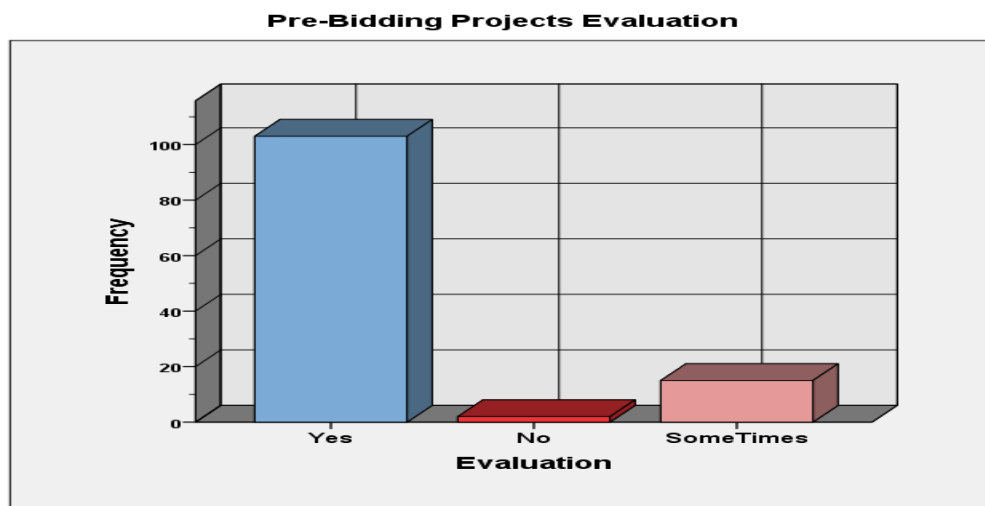
**2-2 Do you evaluate the proposed project before bidding for the project?**

Yes 
                         
 No 
                         
 Sometimes

**Figure 5.10: Question 2-2 of the Questionnaire Survey**

**Table 5.11: Question 2-2 Pre-Bidding Project Evaluation**

Pre-Bidding Project Evaluation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	103	85.8	85.8	85.8
	No	2	1.7	1.7	87.5
	Sometimes	15	12.5	12.5	100.0
	Total	120	100.0	100.0	



**Figure 5.11: Pre-Bidding Project Evaluation**

These results demonstrate that the great majority of participants (85.8%) indicated that they do evaluate their potential projects before deciding to bid. However, there are two respondents (1.7%) who do not evaluate potential projects, and fifteen respondents (12.5%) indicated that they only sometimes evaluate their potential projects after accepting the invitation to bid. Generally, these significant agreement responses express the importance of the evaluation practices amongst practitioners.

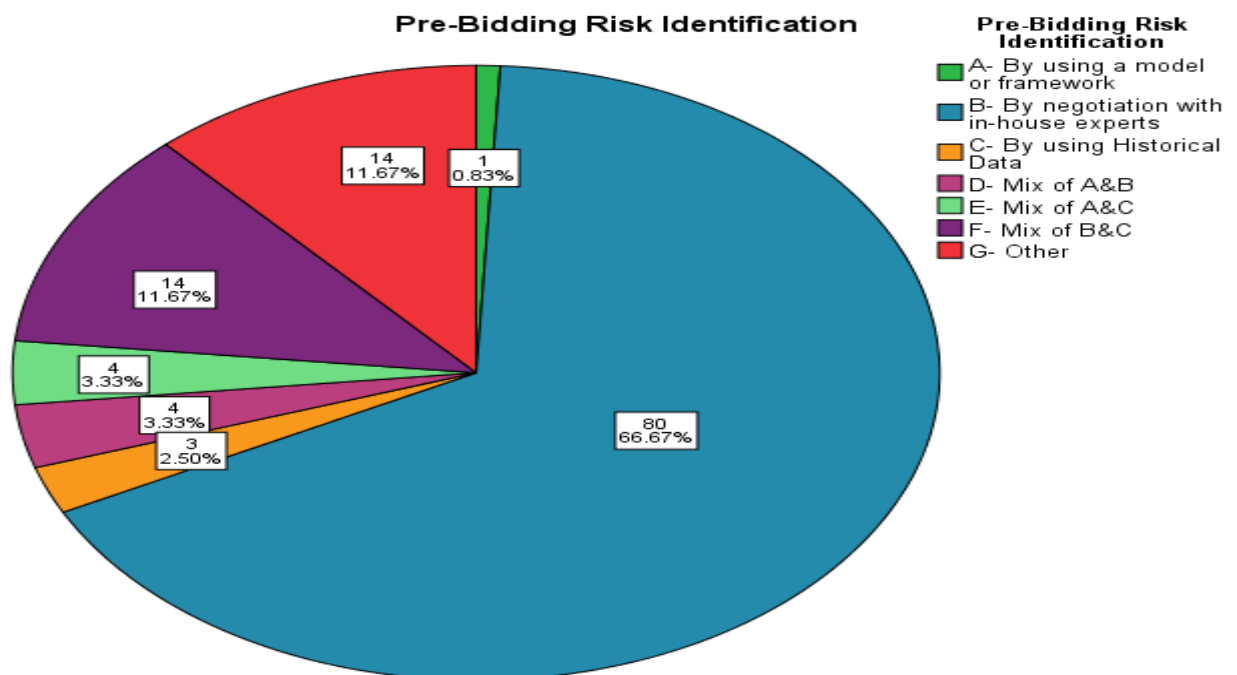
**Q. 2-3:** To investigate the methods and techniques that participants use in order to identify risks in their potential projects before deciding to bid. This question is presented to the participants as shown in Figure 5.12 and the results are shown in the following Table 5.12 and Figure 5.13.

2-3 How do you identify risks in the proposed projects before deciding to bid?	
You can choose more than one choice if needed	
A	<input type="checkbox"/> By using a decision aid model/framework
B	<input type="checkbox"/> By negotiations with in-house experts
C	<input type="checkbox"/> By using your historical data
D	<input type="checkbox"/> Other <span style="float: right;">If other please specify</span>
.....	

**Figure 5.12: Question 2-3 of the Questionnaire Survey**

**Table 5.12: Question 2-3 Pre-Bidding Risk Identification**

Pre-Bidding Risks Identification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A- Using a model or framework	1	.8	.8	.8
	B- Discussion with in-house experts	80	66.7	66.7	67.5
	C- Using Historical Data	3	2.5	2.5	70.0
	D- Mix of A&B	4	3.3	3.3	73.3
	E- Mix of A&C	4	3.3	3.3	76.7
	F- Mix of B&C	14	11.7	11.7	88.3
	G- Other	14	11.7	11.7	100.0
	<b>Total</b>	120	100.0	100.0	



**Figure 5.13: Pre-Bidding Risk Identification**

From the results shown above, it can be seen that, there is only one respondent indicates that his organisation is using a model or framework for potential project risk identification, while the majority of respondents (66.7%) use negotiation with in-house experts for this mission. Three respondents (2.5%) reported using historical data for this purpose, while four respondents (3.3%) indicated that they use both a model/framework and negotiation with in-house experts to identify risks. Another four respondents (3.3%) reported that they identify risks by using both a model/framework and historical data to identify risks, while fourteen respondents (11.7%) said they identify risks using both in-house experts and historical data. The remaining fourteen respondents (11.7%) reported that they use other methods, such as external experts, to identify risks for their potential

project. Thus, in general, only 9 participants out of 120 (7.5%) are using models or frameworks as part of their procedure to identify risks for their potential projects; this low percentage motivates this research to improve such a situation, and to provide another solution.

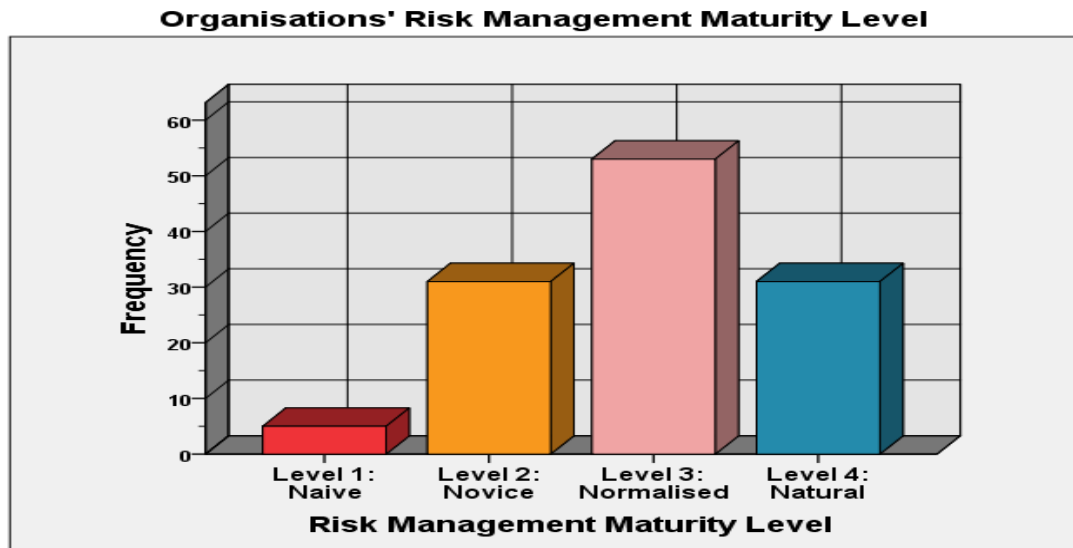
**Q. 2-4:** This question is investigates the Risk Management Maturity Level (RMML) in the participants' organisations. The question is presented to the participants with four clarified choices; and they were asked to choose one choice only, as shown in Figure 5.14.

2-4 How do you describe risk management maturity level in your organisation?	
Please choose one choice only	
Level 1: Naive <input type="checkbox"/>	Level 1: The Naive risk organisation is unaware of the need for management of risk, and has no structure approach to dealing with uncertainty. Management processes are repetitive and reactive, with little or no attempt to learn from the past or to prepare for future threats or uncertainties.
Level 2: Novice <input type="checkbox"/>	Level 2: The Novice risk organisation is experimenting with application of risk management, usually through a small number of nominated individuals, but has no formal or structure generic processes in place. Although aware of the potential benefits of managing risk, the organisation has not effectively implemented risk processes and is not gaining the full benefits.
Level 3: Normalised <input type="checkbox"/>	Level 3: The Normalised risk organisation has built management of risk into routine business processes and implements risk management on all projects. Generic risk processes are formalised and widespread, and the benefits are understood at all levels of the organisation, although they may not be consistently achieved in all cases.
Level 4: Natural <input type="checkbox"/>	Level 4: The Natural risk organisation has a risk-aware culture, with a proactive approach to risk management in all aspects of the business. Risk information is actively used to improve business processes and gain competitive advantage. Risk processes are used to manage opportunities as well as potential negative impacts.

**Figure 5.14: Question 2-4 of the Questionnaire Survey**

**Table 5.13: Question 2-4 Risk Management Maturity Level (RMML)**

Organisations Risk Management Maturity Level (RMML)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Level 1: Naive	5	4.2	4.2	4.2
	Level 2: Novice	31	25.8	25.8	30.0
	Level 3: Normalised	53	44.2	44.2	74.2
	Level 4: Natural	31	25.8	25.8	100.0
	Total	120	100.0	100.0	



**Figure 5.15: Organisations' Risk Management Maturity Level (RMML)**

Table 5.13 and Figure 5.15 show the results of this question. It can be seen that there just are five respondents (4.2%) who described their organisations as being in Level 1 'Naïve' in terms of Risk Management Maturity Level (RMML), while there are thirty-one respondents (25.8%) who described their organisation as situated in Level 2 'Novice' of RMML. However, 44.2% respondents described their organisations as being in Level 3 'Normalised' of RMML, and 25.8% described their organisations as in Level 4 'Natural'.

Thus, it was found that a total of 70% of respondents work in a risk-aware culture organisations; which enhances the credibility of these respondents and confidence in their ability of to assess the factors affecting the bid/no bid decision in the third section of the questionnaire survey.

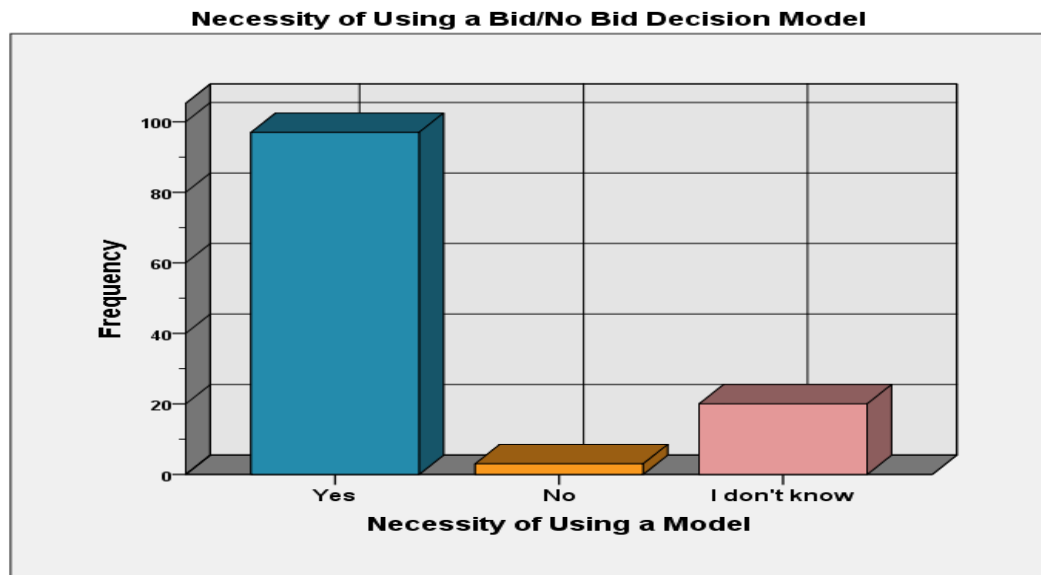
**Q. 2-5:** This question is to examine the need for a bid/no bid decision aid to evaluate potential projects. The question was presented to the participants as shown Figure 6-16.

<b>2-5 Do you think that your organisation needs a bid/no bid decision model in order to evaluate potential projects before entering the bidding stage?</b>											
Yes <input type="checkbox"/> No <input type="checkbox"/> I do not know <input type="checkbox"/>											

**Figure 5.16: Question 2-5 of the Questionnaire Survey**

**Table 5.14: Question 2-5 Necessity of Using a Bid/No Bid Decision Model**

Necessity of Using a Bid/No Bid Decision Model					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	97	80.8	80.8	80.8
	No	3	2.5	2.5	83.3
	I don't know	20	16.7	16.7	100.0
	Total	120	100.0	100.0	



**Figure 5.17: Necessity of Using a Bid/No Bid Decision Model**

The results shown in Table 5.14 and Figure 5.17 indicate that over 80% of the participants believe that their organisations need to use a bid/no bid decision model in order to evaluate potential projects before entering the bidding stage. Nevertheless, three respondents (2.5%) did not believe that a decision model is needed by their organisations, while twenty respondents (16.7%) do not have an exact answer or are not certain if their organisations need a bid/no bid decision model to evaluate potential projects. However, this overall result positively motivates the aim of this research, as it provides a further indication of the need for an aid that helps contractors' organisations to make their bid/no bid decision accurately in order to achieve project success.

**Q. 2-6:** This question aims to investigate whether the model should consider the organisation's current situation in addition to risk identification for better potential projects evaluation. The question is presented in Figure 5.18 and the results are shown in Table 5.15 and Figure 5.19.



2-6 Do you think that a bid/no bid decision model should take into account risks of Public-Private Partnership projects and international investment in parallel with the organisation's current situation for better potential projects evaluation?

Yes

No

I do not know

Figure 5.18: Question 2-6 of the Questionnaire Survey

Table 5.15: Question 2-6 Features of Decision Model

Decision Model Features					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	96	80.0	80.0	80.0
	No	3	2.5	2.5	82.5
	I don't know	21	17.5	17.5	100.0
	Total	120	100.0	100.0	

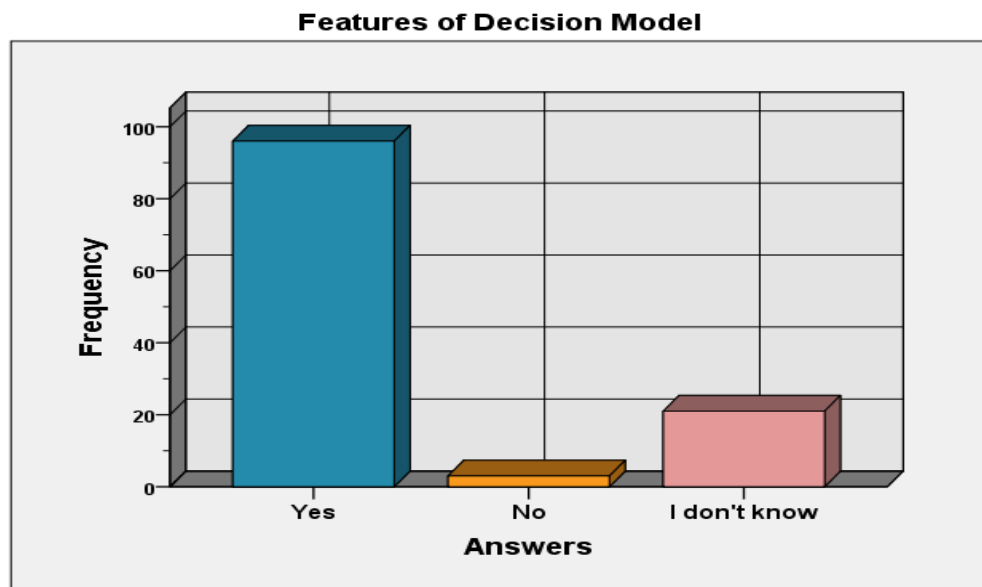


Figure 5.19: Features of Decision Model

As can be seen in the results shown above, most respondents (80%) agreed that the decision model should take into account the organisation's current situation, together with risk identification, for better potential projects evaluation, while three respondents (2.5%) did not agree, and only twenty-one participants (17.5%) were not certain if the decision model should take into account the organisation's current situation together with risk identification for better potential project evaluation.

Clearly, a significant majority of respondents endorse the adoption of this element of the research objective in order to create a bid/no bid decision model which includes the feature of analysing the contractor's current situation, in addition to the other features for a critical and logical decision.

**Q. 2-7:** This question investigates' respondents point of view on whether the development of a model with the features mentioned above could contribute to improving risk management performance and help organisations to achieve project success or not. The question is presented as shown in Figure 5.20 and the results are shown in Table 5.16 and Figure 5.21.

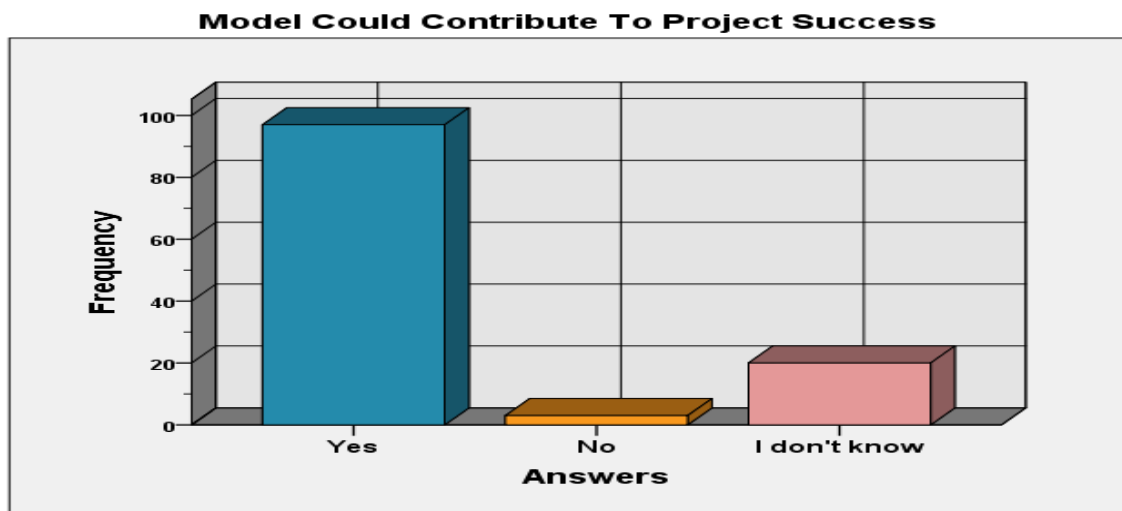
**2-7 Do you think that the development of such a model could contribute to enhance projects' success and improve risk management performance of the contractor organisations?**

Yes                       No                       I do not know

**Figure 5.20: Question 2-7 of the Questionnaire Survey**

**Table 5.16: Question 2-7 Model Could Contribute To Projects' Success**

Model Could Contribute To Project Success					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	97	80.8	80.8	80.8
	No	3	2.5	2.5	83.3
	I don't know	20	16.7	16.7	100.0
	Total	120	100.0	100.0	



**Figure 5.21: Model Could Contribute To Project Success**

The results above demonstrate that over 80% of the respondent confirmed that creating such a model will contribute to improving risk management performance and thus help organisations to achieve projects success: conversely, three respondents gave no credence to such capability, while twenty participants (16.7%) were not sure if the decision model could contribute to improving risk management performance and help organisations to achieve project success. This result confidently, confirms the need for a rational decision model to help contractors' organisations to make their bid/no bid decisions correctly, in order to achieve project success.

### **5.7.3. Results of Section Three: Factors Affecting Bid/No Bid Decisions**

The main goal of this section is to identify the level of importance of the prospective factors that could affect the bid/no bid decision. The participants were requested to assess the effectiveness of the categorised listed factors, based on their experience and knowledge regarding the interaction of these seventy-seven factors with their bid/no bid decisions.

Thus, the participants were asked to choose an appropriate rating scale for each factor, where the scale ranges from 1 to 10. Scale 1 indicates the lowest effect, whereas scale 10 indicates the highest effect. This scale will be used to generate an importance index ( $Ib_i$ ) for each factor ( $F_i$ ), as will be clarified in the next subsection.

#### **5.7.3.1. Determination of the Importance Indices**

According to Shash and Abdul-Hadi (1993), for assessing factors, the participating contractors will provide a numerical scoring 'weight' for factors, expressing their opinions on the significant influence of each factors to the related subject. For this type of data, the importance index ( $Ib_i$ ) of each factor ( $F_i$ ) can be produced by the following formula:

$$\text{Importance Index } (W) = \sum(a * X) * \left(\frac{100}{10}\right) \quad \text{Equation (2)}$$

Where:

$a$  = a constant expressing the weight giving to the factor in each response ( $1 \leq a \leq 10$ )

$$X = n/N$$

$n$  = the frequency of the response

$N$  = the total number of responses

### 5.7.3.2. Ranking of the Factors Affecting the Bid/No Bid Decision

By implementing the formula above, ranking factors based on their importance indices will be presented, where the highest rank should be closest to one-hundred and the lowest rank should be closest to zero. The factors ranking order is shown in Table 5.17.

**Table 5.17: Ranking Order of Factors**

Order	Code	Factor Description	Ib
1	F64	The project information is sufficient	93.92
2	F76	The organisation is capable of conducting the project	93.17
3	F71	The project's cash flow is secured	92.67
4	F77	The project matches the organisation's strategy and future vision	91.92
5	F49	The type of contract for the project is recognised worldwide	91.00
6	F50	Level of acceptance of the contract conditions	86.50
7	F53	Clarity of the work and specifications needed for the project	86.17
8	F43	Consideration of the financial risks of the country (including exchange rate fluctuations, inflation, interest rate fluctuations and taxes)	85.58
9	F61	Level of availability of resources and manpower	84.08
10	F36	Taking into consideration the condition of clear rules and determined responsibilities between partners	83.75
11	F56	The accuracy of the cost estimated by the contractor	83.17
12	F70	The availability of work-capital required to start the project	82.08
13	F40	Considering the availability of a conflict resolution strategy for the targeted relationship	81.92
14	F45	Considering the use of local management and staff, the formation of joint ventures and/or consortia, or the use of local agents, local sponsors or facilitators in the target country	81.42
15	F35	Considering risk awareness in general for the proposed project and the targeted relationship	81.00
16	F48	Evaluation of the client's negative characteristics in the target country, such as late payment, corruption, delays in approvals and permits, and government bureaucracy and poor infrastructure	79.50
17	F41	Considering the economic stability of the targeted country of project	79.33

18	F29	Consideration of applying open communication and trust between partners	77.42
19	F65	Reputation of the management consultant appointed by the client	76.83
20	F33	Considering the accessibility of political support and facilitation in the targeted country	75.33
21	F52	The accuracy of the original cost estimated by the client	75.25
22	F8	Compatibility of the organisation's type of work with the type/nature of the project	74.08
23	F73	Considering the ease of obtaining a bank loan if needed	73.25
24	F34	Considering the adoption of local and global expert advice and review for the proposed project in the targeted country	72.67
25	F60	Considering safety hazards	72.25
26	F62	Supply chain management consideration	72.17
27	F26	Considering the adoption of an effective procurement route to conduct the project	72.00
28	F9	Considering the level of acceptance of the project's duration	71.42
29	F10	Considering the past experience with similar projects	71.42
30	F7	Considering the location of the project	70.67
31	F5	Considering the organisation's financial situation	70.50
32	F42	Consideration of predictable political risks of the country such as visa restrictions and customs constraints	70.50
33	F54	Clarity of quality scope required for the project	69.42
34	F14	Considering the client's reputation	69.17
35	F46	Understanding the cultural variables allied with all project stakeholders; and the adaptation of new management skills and techniques in order to accommodate them	68.92
36	F31	Level of respect between partners	68.33
37	F66	Considering the project management system required to conduct the project	68.25
38	F57	Degree of possible alternative design to reduce the project cost if allowed	68.00
39	F58	Considering the possibility of additional work needed for fulfilling the project	67.75
40	F68	Considering the Governmental division requirements	67.67
41	F3	Considering the organisation's current projects' performance	67.58
42	F51	The accuracy of bill of quantity provided by the client	67.50
43	F6	Considering the level of acceptance of the project's size in Saudi Riyals	67.42
44	F39	Considering the innovation capability in the targeted relationship	67.17
45	F22	Considering the scope of work required to enter the bid	66.83
46	F55	Level of completeness of project's design	66.83
47	F30	Willingness of partners to compromise and collaborate	66.75
48	F69	Considering the adequacy of advance payment provided by client if existed	65.83
49	F37	Considering the application of monitoring the partnering processes	65.58
50	F4	Considering the condition of labour availability	65.50
51	F47	Understanding the different legal systems that are in operation in the target country; for Saudi Arabia it is Islamic and customary law practices	65.50
52	F63	Level of familiarity with site condition	64.08
53	F44	Considering the prevailing climatic/geographical conditions of the target country of operation	63.92

54	F74	Degree of satisfaction on the expected profit	63.92
55	F28	Level of commitment of partners	63.67
56	F27	Unifying a specific vision with partners	63.50
57	F38	Taking into consideration local and/or global subcontractors' involvement for conducting the proposed project	63.08
58	F12	Considering the client's financial capacity	62.75
59	F67	Considering the project supervision procedure for the targeted relationship	62.50
60	F23	Availability of the required performance security (bond & guarantee)	62.25
61	F25	Considering the early implementation of partnering relationship	61.67
62	F72	Considering general office overhead	61.42
63	F59	Considering the use of nominated subcontractors requested by the client	61.33
64	F21	Considering the classification degree required to enter the bid	60.58
65	F13	Considering the ability of the client to provide a financial guarantee	60.42
66	F2	Considering the organisation's current workload	59.67
67	F75	The benefits expected in terms of general relationship	58.33
68	F15	Considering the previous experience with the client if existed	57.83
69	F17	Considering the easiness of obtaining project payments from the client	57.67
70	F20	Considering the expected competitors before entering the bid	57.67
71	F32	Taking into consideration the community outreach	57.33
72	F1	Considering the need for a new project	57.08
73	F24	The expected chance of winning the bid	53.67
74	F11	Considering the benefits expected in terms of the renewal stage of the classification certificate after conducting the project	51.08
75	F16	Consideration of other potential projects available from the same client	49.83
76	F19	Sufficiency of time remaining to submit the bid	47.42
77	F18	Level of acceptance of the bid document price	42.92

From this table, it can be seen that the highest importance index is 93.92, with the highest five ranked factors being as follows: 1) The project information is sufficient, 2) The organisation is capable of conducting the project, 3) The project's cash flow is secured, 4) The project matches the organisation's strategy and future vision, and 5) The type of contract for the project is recognised worldwide.

The lowest importance index is 42.92, and the lowest five ranked factors are as follows: 1) Level of acceptance of the bid document price, 2) Sufficiency of time remaining to submit the bid, 3) Consideration of other potential projects available from the same client, 4) Considering the benefits expected in terms of the renewal stage of the classification certificate after conducting the project, and 5) The expected chance of winning the bid. Furthermore, none of the participating contractors added any more factors to be considered.

## **5.8. Summary of Chapter Five**

Following the pragmatic epistemology, on which the research designed is based, this chapter has presented the results of the third phase of the research design, which was conducted through a quantitative questionnaire survey. The chapter has also shed light on the research scope, required data, and the sampling type used. In brief, after presenting the questionnaire survey results, this chapter confirmed the findings of the literature review in terms of the importance of the elements laid out in the research aim and objectives, that is, the need for such a decision model to address international investors bidding decisions from the perspective of risk management for PPPs projects in Saudi Arabian construction industry. In particular, the descriptive results of questions 5, 6, and 7 of section 2 of the questionnaire survey show that the majority of participants' organisations (97, 96, and 97 out of 120 respectively) would appreciate the existence of a strategic decision model from the perspective of risk management that could help them to aid their bidding decisions for potential PPP projects in the Saudi Arabian construction industry.

The descriptive results of the questionnaire survey, which was conducted quantitatively under the random-purposeful sampling type as the third phase of the research design, have been described in this chapter, while the analytical results will be discussed in the next chapter. The seventy-seven factors affecting the bid/no bid decisions were ranked based on their weight of importance, and the highest and lowest ranking order factors were determined. As a result, the findings of this chapter contributed to achieving the aim and objectives of this research. In particular, this chapter's findings help to achieve the objectives of identifying bid/no bid decision factors, PPP success factors, and international investment success factors gathered from both the literature review and the practical points of view in the field. These findings also presented the importance level of these factors to be adopted and applied in pursuing the main aim of this research. The questionnaire survey has four objectives, as stated above, one of which is related to investigating the level of importance of the factors affecting the investment decision, and then ranking them according to their importance to the contractor organisations. This objective has been fulfilled, while the other objectives will be discussed in the next chapter, when conducting the statistical analysis of the quantitative questionnaire survey.

## **CHAPTER 6: QUANTITATIVE RESEARCH STRAND - ANALYSIS AND DISCUSSION**

### **6.1. Introduction**

The previous chapter focused on the survey design, and relied on the qualitative research strand finding to design the questionnaire. Subsequently, the previous chapter presented the descriptive results of the questionnaire based on the SPSS analysis software. However, in this chapter further statistical analysis (the fourth phase of the research design) is targeted at investigating the behaviour of participants' organisations as a sample in this research in order to generalise the finding results. Statistical results are required in order to investigate the different behaviours of the participants' organisations in parallel with their differences in terms of the features of their organisations, such as the classification status, type of work, annual business volume, and the main client type. Thus, the statistical findings will help to design the desired model based on the different behaviours distinguished in the sample in this research.

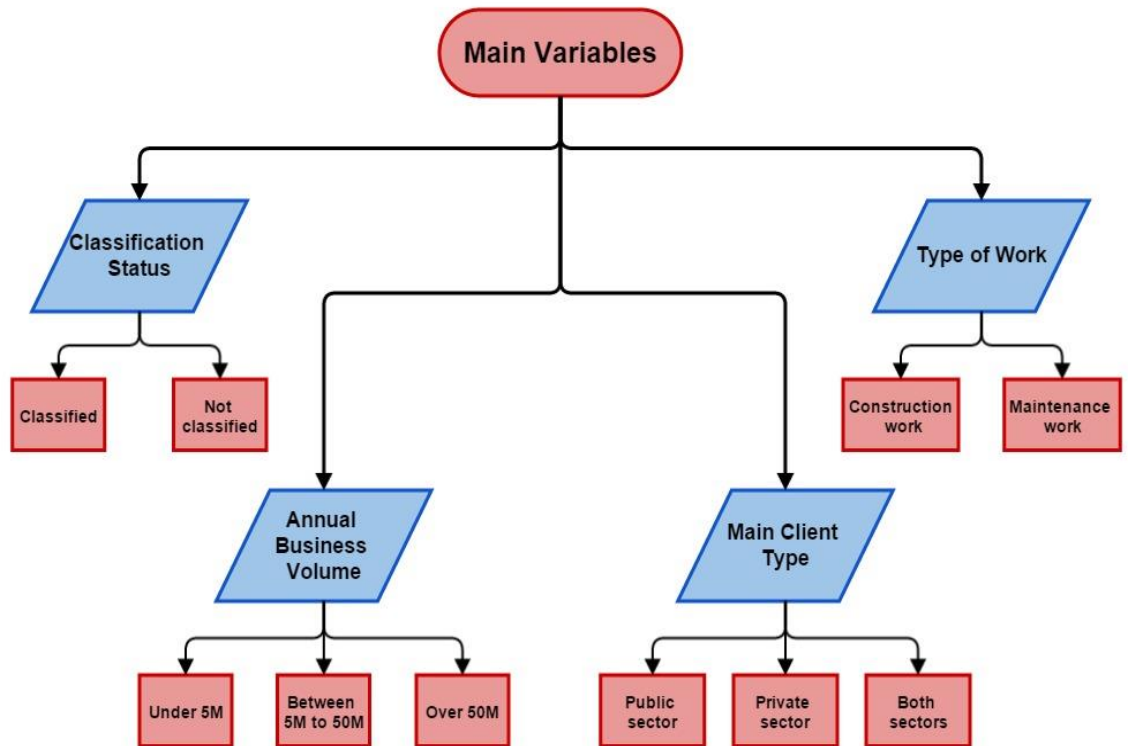
### **6.2. Approach to Analysis**

The SPSS software was used to prepare tables, figures and charts to present the results. Data entry, coding, and labelling were prepared for the SPSS database in order to interpret the statistical results of each part of the questionnaire survey as explored in the previous chapter. Thence, further statistical analysis was undertaken to determine percentages and frequencies and compare means, and ANOVA and chi-square tests were carried out, based on the differences between the participants' organisations.

Indeed, section one of the questionnaire survey is actually designed to distinguish the participants' answers, as there are different construction organisations involved in the research sample. The following figure summarises the main variables of the questionnaire survey. These main variables will provide a reliable and effective base to construct a model with an approach that can simulate such differences in the real and practical situation of the sampled population. This simulation will be used in the model



construction phase in order to identify the characteristics of the models' intended user, which will be discussed further in the model design chapter.



**Figure 6.1: Main Variables of Participants' Organisations**

The descriptive results for each variable were presented in the previous chapter (5.7.1. Results of Section One). However, it should be noted that, due to the exceptional circumstances that accompanied the conduct of this research, where the partnership between both public and private sectors in the Kingdom of Saudi Arabia is unique of its kind, in that only a very-small number of projects have been implemented in this scheme, and based on the recommendations of SAGIA, explained in section 5.4.1: Sample Selection, two of the four main variables have been excluded in all the samples. Thus, the research relies on the annual business volume and the main client type as the main variables to distinguish the behaviour of the participants' contractor organisations for the statistical analysis.

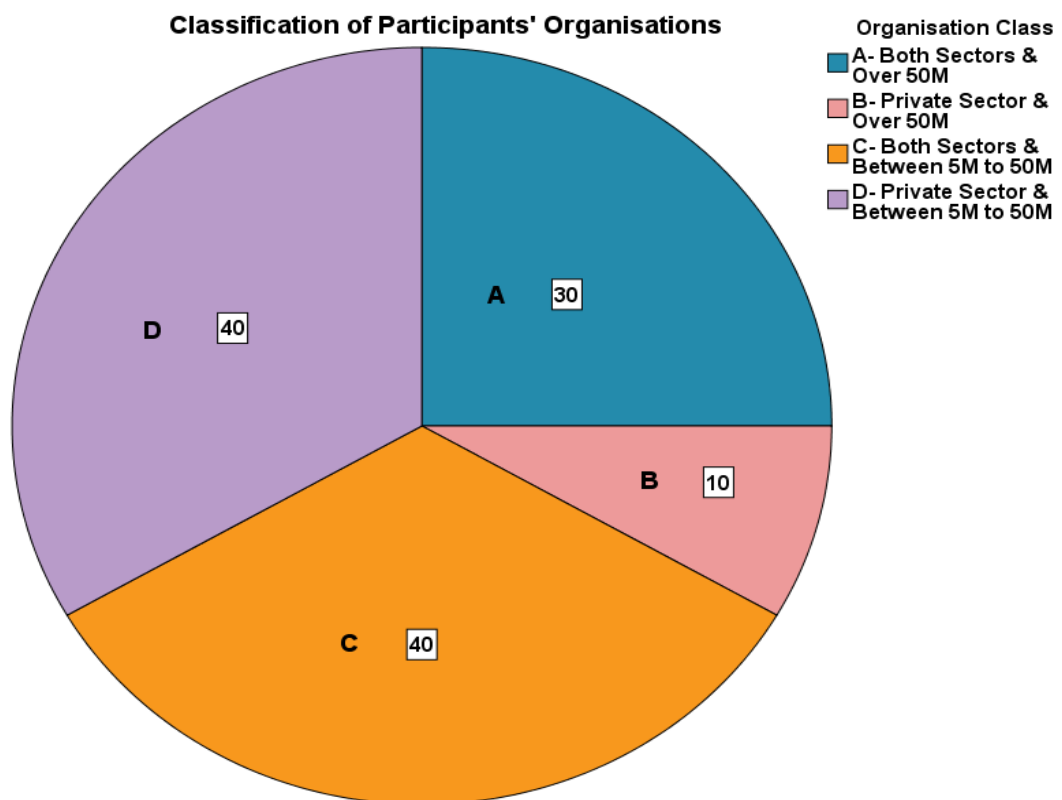
Therefore, as all of the participants' organisations are classified and working in construction type of work, different classes of organisations are statistically generated as an independent variable that has different levels/classes based on the applied two main variables (the annual business volume and the main client type) included in each

level/class. These levels of the independent variable correspond to different groups or conditions (Pallant, 2011).

**Table 6.1: Classes of Participants' Organisations**

Classes of Organisations					
Class/Group		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A) Both Sectors & Over 50M	30	25.0	25.0	25.0
	B) Private Sector & Over 50M	10	8.3	8.3	33.3
	C) Both Sectors & Between 5M to 50M	40	33.3	33.3	66.7
	D) Private Sector & Between 5M to 50M	40	33.3	33.3	100.0
	Total	120	100.0	100.0	

From the results above, the participants' organisations involved in the questionnaire survey were classified into four classes based on the two main variables applied. These classification (A, B, C, and D) will be implemented as the different levels/classes of the independent variable 'the organisations' classes' for the statistical analysis tests required in order to distinguish different behaviours of respondents' organisation.



**Figure 6.2: Classification of Participants' Organisations**

### **6.3. Differences in Responses Based On the Independent Variable**

After identifying the organisations' classes, the next step is to investigate the differences in responses based the main variables mentioned earlier. Such an investigation will lead to better understanding of the organisations' behaviour in terms of making their bidding decisions and their current practices of risk management. An initial conceptual model will be designed after this investigations to be used for the next chapter, when interviewing expert personnel to present the results and to validate and develop the initial model. Thus, the following sections will present the differences in responses and support these findings with statistical tests, as appropriate, with their justifications for the second section of the questionnaire survey.

#### **6.3.1. Importance of Project Selection**

In Table 5.9 in the previous chapter, it was shown that the great majority of respondents (85.8%) agreed that the project selection consideration is an important stage to the whole project success. This result helps to confirm the importance and need for this research, which can be evident as well from the mean value obtained ( $\mu=4.47$  out of 5) in Table 5.10.

However, it is essential to investigate the differences in responses based on the independent variable (the organisations' classes) in order to find out whether there is a statistical relationship between the condition which is here a continuous scale as a Likert scale from low to high for the importance of project selection, and the classes' main variables (annual business volume & main client type) and the differences or similarities in the participants' choices/answers. Thus, the tendencies in the behaviour of the participants' organisations can be established.

In this situation, the most appropriate statistical analysis test to apply is the analysis of variance (ANOVA), as it is interested to compare the mean scores of more than two groups/classes. In particular, the one-way ANOVA is very useful because it is capable of comparing the variance between the different groups/classes with the variability within each of the groups/classes (Pallant, 2011).

Moreover, another important reason to run a one-way ANOVA test is that it is not only capable of just discovering whether the means of three or more groups are different; instead, when ANOVA is combined with post hoc tests, it is capable of finding out where the group differences specifically lie (Keppel and Wickens, 2004).

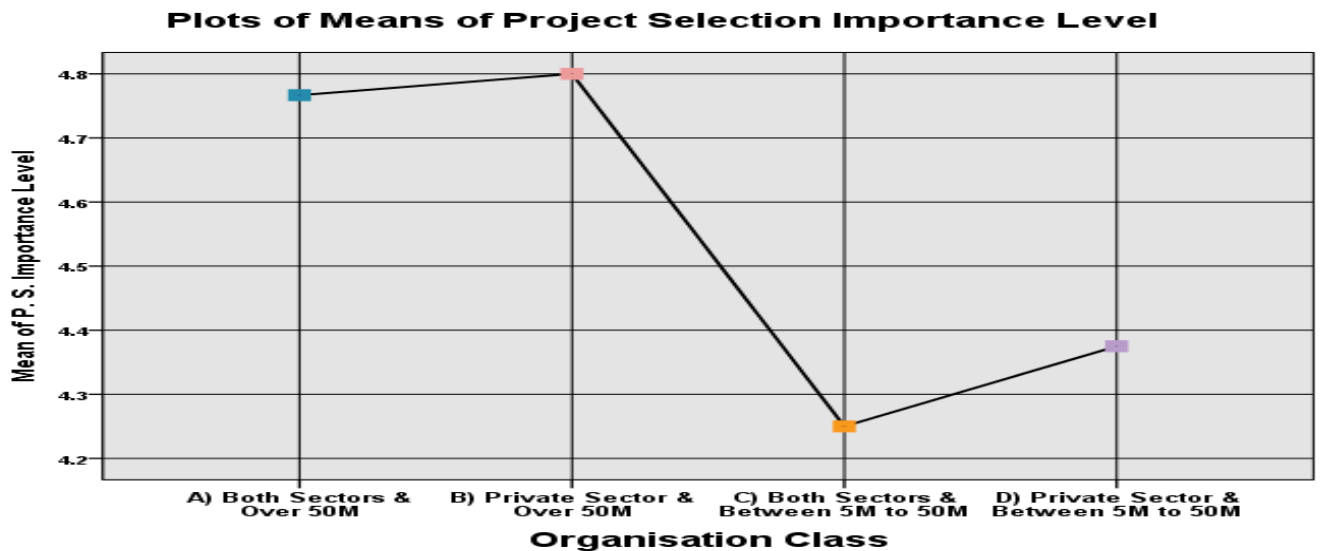
And regarding post hoc tests, Pallant (2011) explains that in conducting post-hoc tests, we are interested in investigating all possible pairwise comparisons in order to compare all possible combinations of groups of the independent variable, and that whilst there are many different post hoc tests, generally the most appropriate one for assessing all pairwise comparisons in a one-way ANOVA is Tukey’s post hoc test. Hence, the one-way ANOVA with Tukey’s post hoc test will be run to investigate the differences in responses based on the independent variable.

**Table 6.2: Descriptive Analysis of Project Selection Importance Level**

Descriptive of Project Selection Importance Level								
Class/Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Both Sectors & Over 50M	30	4.77	.430	.079	4.61	4.93	4	5
Private Sector & Over 50M	10	4.80	.422	.133	4.50	5.10	4	5
Both Sectors & Between 5M to 50M	40	4.25	.742	.117	4.01	4.49	3	5
Private Sector & Between 5M to 50M	40	4.38	1.030	.163	4.05	4.70	2	5
Total	120	4.47	.798	.073	4.32	4.61	2	5

From the descriptive table above, it can be seen that the mean increases slightly from  $4.77 \pm 0.43$  to  $4.8 \pm 0.422$  when comparing the first and second groups, the Both sectors & over 50M and Private sector & over 50M respectively. However, the mean decreases sharply to  $4.25 \pm 0.742$  and thence increases slightly to  $4.38 \pm 1.03$  when comparing the third and fourth groups. This can be seen clearly in Figure 6.3 below.

The differences in the mean values indicated to the different behaviour of participants’ organisations, as the result showed that large contractor organisation, and particularly those organisations who deal with private sector only, agreed that the project selection consideration at the strategic level before bidding for a PPPs is an important stage to the whole project success. This result helps to confirm the importance and need for projects’ evaluation before bidding stage, which is argued in the literature to be a key for success.

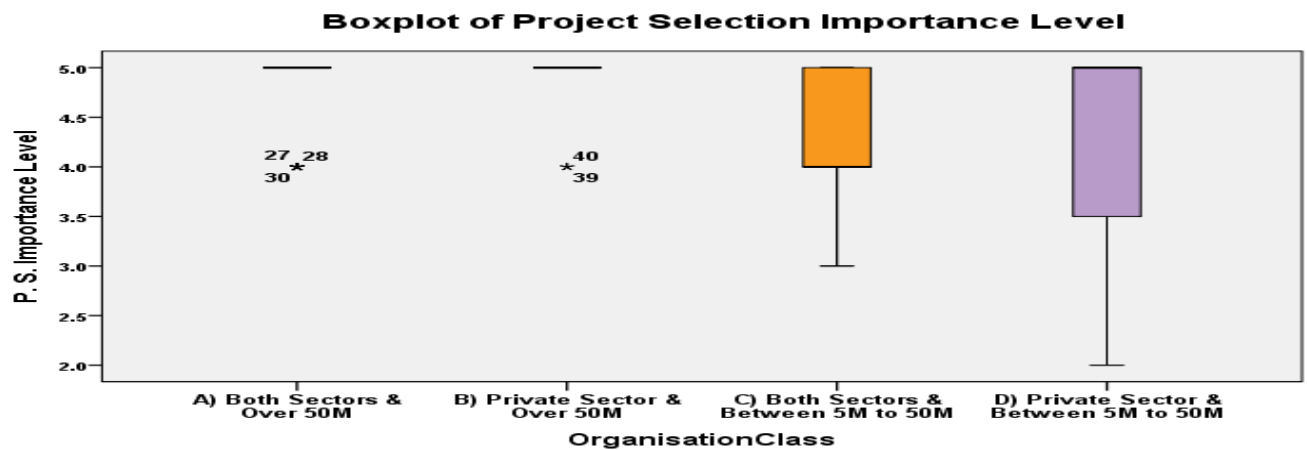


**Figure 6.3: Plots of Means of Project Selection Importance Level**

According to Pallant (2011) and Lund and Lund (2013), in order to run a one-way ANOVA, there are six assumptions that need to be considered as follows:

- 1) Having one dependent variable that is measured at the continuous level, which is the condition or question that the research would like to investigate. In this case, it is the condition of project selection importance level.
- 2) Having one independent variable that consists of two or more categorical, independent groups, which is the organisations' classes or groups discussed above and consists of four different classes.
- 3) Having independence of observations, which means that there is no relationship between the observations in each group of the independent variable or between the groups themselves. Most often, this occurs simply by having different participants in each group.
- 4) There should be no significant outliers in the groups of the independent variable in terms of the dependent variable, where outliers mean values that are well below or well above the other scores.
- 5) The dependent variable should be approximately normally distributed for each group of the independent variable.
- 6) Having homogeneity of variances, which means the variance is equal in each group of the independent variable.

The first three assumptions have already been discussed and there are no violations regarding them. However, the other assumptions will be discussed further in detail. Regarding the fourth assumption, SPSS software can explore the descriptive statistics and provide a boxplot. A boxplot is a very useful graphical plot for understanding the distribution of the data, and it is also often used for detecting outliers (Pallant, 2011).



**Figure 6.4: Boxplot of Project Selection Importance Level**

Lund and Lund (2013) point out that, in order to identify outliers in the boxplot, any data points that are more than 1.5 box-lengths from the edge of their coloured box are classified by SPSS Statistics as outliers and are illustrated as circular dots (°), while any data points that are more than 3 box-lengths away from the edge of their box are classified as extreme points or extreme outliers and are illustrated with an asterisk (\*). Thus, from the boxplot figure above, as assessed by inspection of the boxplot, it is obvious that there are cases with values well above the majority of the other cases with an asterisk symbol. These values can be considered as extreme outliers, and can be seen for the first and second groups of the independent variable. Solutions for such a violation will be discussed after examining the fifth assumption of ANOVA in the next paragraphs.

Regarding the fifth assumption, the normal distribution for each group of the independent variable, Lund and Lund (2013) point out that for a sample size greater than 50 participants, the Kolmogorov-Smirnov test of normality is recommended, as the Shapiro-Wilk test of normality is more accurate for sample sizes < 50 participants. Thus, the test of normality table is generated for this dependent variable (Project Selection Importance Level) and it is found that the normality assumption is violated and the data is not

normally distributed, as the Sig. values of Kolmogorov-Smirnov indicate significant results ( $p < 0.05$ ).

**Table 6.3: Test of Normality for Project Selection Importance Level**

Project Selection Importance Level Tests of Normality							
Organisation Class		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	Df	Sig.
P. S. Importance	Both Sectors & Over 50M	.473	30	.000	.526	30	.000
	Private Sector & Over 50M	.482	10	.000	.509	10	.000
	Both Sectors & Between 5M to 50M	.269	40	.000	.787	40	.000
	Private Sector & Between 5M to 50M	.428	40	.000	.632	40	.000
a. Lilliefors Significance Correction							

Nevertheless, for violations in assumptions four and five, the outliers and normality respectively, both Pallant (2011) and Lund and Lund (2013) explain that such violations are quite common in research studies with a large sample size, and that although the outliers and normality assumptions have been violated, it can be proceeded to the following assumption ‘the homogeneity’ for one-way ANOVA test; however, it is recommended to compare the ANOVA results with non-parametric test such as the Kruskal-Wallis H or The Mann-Whitney U test. Thus, after conducting the one-way ANOVA test, the result will be compared with the most appropriate non-parametric test.

Proceeding towards ANOVA, the last assumption is about the homogeneity of variances. This can only be tested by using Levene’s test of equality of variances as one way of determining whether the variances between groups for the dependent variable are equal or not. This test should generate a significance value ( $p$ ) of greater than 0.05 to indicate a not-significant result which means the existence of homogeneity of variance.

**Table 6.4: Test of Homogeneity of Variances for Project Selection Importance Level**

Test of Homogeneity of Variances			
P. S. Importance Level			
Levene Statistic	df1	df2	Sig.
11.914	3	116	.000

From the results of Levene’s test for equality of variances the significance value ( $p$ ) is less than 0.05, which means the homogeneity of variances assumption is violated; and the variances between groups for the dependent variable are not equal. In this case, the standard one-way ANOVA test cannot be used, but we must use a modified version of the ANOVA (Lund and Lund, 2013). Also, Pallant (2011) explains that there are two modified versions of the one-way ANOVA, Welch and Brown-Forsythe tests, which can be found in the robust tests of equality of means when conducting the standard one-way ANOVA. Thus, the modified ANOVA will be implemented.

**Table 6.5: The Modified ANOVA Tests for Project Selection Importance Level**

Robust Tests of Equality of Means				
P. S. Importance Level				
	Statistic <sup>a</sup>	df1	df2	Sig.
Welch	5.649	3	41.375	.002
Brown-Forsythe	4.377	3	95.197	.006
a. Asymptotically F distributed.				

From the results above, for both Welch and Brown-Forsythe tests, it can be seen that the significance values ( $p$ ) are less than 0.05, which is statistically significant; and it can be concluded that not all group means are equal in the population. Further, the Welch ANOVA result should be investigated with the Games-Howell post hoc test results to determine where exactly the differences lie. Further, Lund and Lund (2013) point out that the Games-Howell post hoc test is a useful test in order to compare all possible combinations of group differences, when the assumption of homogeneity of variances is violated; as it provides confidence intervals for the differences between group means and shows where the differences are statistically significant. The Games-Howell post hoc test is presented in the Multiple Comparisons table, as shown in the following Table 6.6.



**Table 6.6: Games-Howell post hoc test**

Multiple Comparisons							
Dependent Variable: Project Selection Importance Level							
	(I) Organisation Class	(J) Organisation Class	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	A) Both Sectors & Over 50M	Private Sector & Over 50M	-.033	.155	.996	-.48	.41
		Both Sectors & Between 5M to 50M	.517*	.141	.003	.14	.89
		Private Sector & Between 5M to 50M	.392	.181	.146	-.09	.87
	B) Private Sector & Over 50M	Both Sectors & Over 50M	.033	.155	.996	-.41	.48
		Both Sectors & Between 5M to 50M	.550*	.178	.023	.06	1.04
		Private Sector & Between 5M to 50M	.425	.210	.199	-.14	.99
	C) Both Sectors & Between 5M to 50M	Both Sectors & Over 50M	-.517*	.141	.003	-.89	-.14
		Private Sector & Over 50M	-.550*	.178	.023	-1.04	-.06
		Private Sector & Between 5M to 50M	-.125	.201	.924	-.65	.40
	D) Private Sector & Between 5M to 50M	Both Sectors & Over 50M	-.392	.181	.146	-.87	.09
		Private Sector & Over 50M	-.425	.210	.199	-.99	.14
		Both Sectors & Between 5M to 50M	.125	.201	.924	-.40	.65

\*. The mean difference is significant at the 0.05 level.

From the comparisons table above, Table 6.6, where the independent variable consists of four groups, there will be a total of six possible combinations of group differences. However, the table above would appear to show twelve combinations, twice the number expected. The reason for this is that each comparison is duplicated and reflecting the two ways in which each comparison can be calculated.

Thus, after examining the results of the Games-Howell post hoc test, there are two statistically significant differences in means. The first one occurs when comparing the mean differences between the groups A and C (Both Sectors & Over 50M and Both Sectors & Between 5M to 50M), where the significance values are less than 0.05 ( $p=0.003$ ), while the second occurs when comparing the mean differences between the groups B and C (Private Sector & Over 50M and Both Sectors & Between 5M to 50M), where the significance value  $p$  is equal to 0.023. Statistically speaking, the behaviour of the contractor organisations in the importance that is attached to project selection in their policies or practices are significantly different; and can be seen in the above Table 6.6 when comparing the behaviours of organisations in the groups that are Over 50 Million (A and B) to the behaviour of the both sectors and less than 50 Million organisations (C). In other words, there is an indication that medium contractor organisations, especially those who deal with both sectors, are subjects to projects failures; due to their insufficient

attention to the importance of potential projects selection decisions as strategical investment decisions linked to projects' success; especially for an immature PPP market such as the Saudi PPP market, as explained in the literature chapter.

It should be noted, that the statistics did not find a significant value indicating significantly different group performance regarding the private and less than 50 Million organisations; such a result is logically acceptable, due to the cautious behaviour that is likely to characterise small-to-medium private organisations' attitudes and decisions, where no previous experience exists of working with public clients.

However, as discussed above, these results should be investigated with non-parametric test for more accurate statistical findings. In this case, based on the results above where the significant values occurred when comparing the behaviour of organisations over 50 Million to the behaviour of the organisations in the group Both sectors and less than 50 Million, the preferable test is the Mann-Whitney U test.

This test, which also called the Wilcoxon-Mann-Whitney test, is a rank-based non-parametric test that can be applied to determine whether or not there are differences between two groups for a continuous or ordinal dependent variable. And it has two useful features to distinguish it from using other non-parametric tests as follows (Pallant, 2011; Lund and Lund, 2013):

- 1) It can be more accurate for groups consisting less than 20 participants, for instance, participants from the Private & Over 50 Million organisations; as the test for such groups will produce an exact Sig. value while other tests will provide only approximate Sig. values.
- 2) It can be applied for an accurate comparison between two groups each time, for the independent variable groups/classes.

To ascertain this, based on the Games-Howell post hoc test results above in Table 6.6, the Mann-Whitney U test will be applied to check the significance values accurate occurrence.

**Table 6.7: Rank Table for First Sig. Value**

Ranks				
Organisation Class		N	Mean Rank	Sum of Ranks
P. S. Importance Level	Both Sectors & Over 50M	30	43.15	1294.50
	Both Sectors & Between 5M to 50M	40	29.76	1190.50
	Total	70		

**Table 6.8: Mann-Whitney U test for First Sig. Value**

Test Statistics <sup>a</sup>	
P. S. Importance Level	
Mann-Whitney U	370.500
Wilcoxon W	1190.500
Z	-3.090
Asymp. Sig. (2-tailed)	.002
a. Grouping Variable: Organisation Class	

A Mann-Whitney U test was run to determine if there were differences in the consideration score of the importance level of project selection between both groups of organisations working in both sectors, those with business annual volume of over 50 Million and between 5 Million to 50 Million, respectively. Distributions of the level scores for both groups were not similar. There is a statistical significant difference, as the test's Sig. value is less than 0.05,  $p = 0.002$ . This value supports the findings of the Welch ANOVA and the post hoc test applied. Also, to confirm the Second Sig. value, another Mann-Whitney U test was run to determine if there were differences in the consideration score of the importance level of project selection between both groups of organisations working in private sectors with business annual volume of over 50 Million and organisations working in both sectors with annual volume between 5 Million to 50 Million.

**Table 6.9: Rank Table for Second Sig. Value**

Ranks				
Organisation Class		N	Mean Rank	Sum of Ranks
P. S. Importance Level	Private Sector & Over 50M	10	33.70	337.00
	Both Sectors & Between 5M to 50M	40	23.45	938.00
	Total	50		

**Table 6.10: Mann-Whitney U test for Second Sig. Value**

<b>Test Statistics<sup>a</sup></b>	
<b>P. S. Importance Level</b>	
Mann-Whitney U	118.000
Wilcoxon W	938.000
Z	-2.188
Asymp. Sig. (2-tailed)	.029
Exact Sig. [2*(1-tailed Sig.)]	.047 <sup>b</sup>
a. Grouping Variable: Organisation Class	
b. Not corrected for ties.	

From the tables above, it can be clearly seen that there is a statistical significant value less than 0.05, indicating different behaviours between group participants regarding the consideration of the importance of project selection for success. However, it is worth noting that, as one of the examined groups has a size smaller than 20 participants, the Mann-Whitney U test generated an exact Sig. value to be considered, which is slightly less than 0.05;  $p = 0.047$  but still statistically significant (Dinneen and Blakesley, 1973).

### 6.3.2. Pre-Bidding Evaluation

From Table 5.11 in the previous chapter, it was shown that the majority of respondents (85.8%) consider pre-bidding evaluation as important to gain success, as it is essential for such a practice to be conducted by their organisations after receiving an invitation to bid, and before bidding as well. However, here it is essential to investigate differences in responses based on the independent variable (the organisations' classes) in order to find out whether there is a statistical relationship between the condition, which is here a nominal scale for the evaluation of proposed potential projects, and the classes' main variables (annual business volume & main client type) and the differences or similarities in the participants' choices/answers to establish the tendencies in the behaviour of the participants' organisations.

In this case, as both the independent and dependent variables are nominal (categorical) scales, the most appropriate statistical analysis test to be applied is the chi-square test for association. Pallant (2011) points out that the chi-square test explores whether two categorical variables are associated, in other words, are related or not. This is done by comparing the frequency of cases found in the various categories of one variable across the different categories of another variable.

Lund and Lund (2013) state that the main aim of such a test is to determine whether two variables are statistically independent or not, and for this reason, this test is also often called the chi-square test of independence. More specifically, it tests for the association or independence between two nominal (dichotomous) variables. Thus, the Chi-square test for association will be applied for this part of the analysis.

**Table 6.11: Chi-Square Tests of Pre-Bidding Evaluation**

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	13.134 <sup>a</sup>	6	.041
Likelihood Ratio	18.137	6	.006
Linear-by-Linear Association	9.259	1	.002
N of Valid Cases	120		

a. 6 cells (50.0%) have expected count less than 5. The minimum expected count is .17.

**Table 6.12: Strength of Association of Pre-Bidding Evaluation**

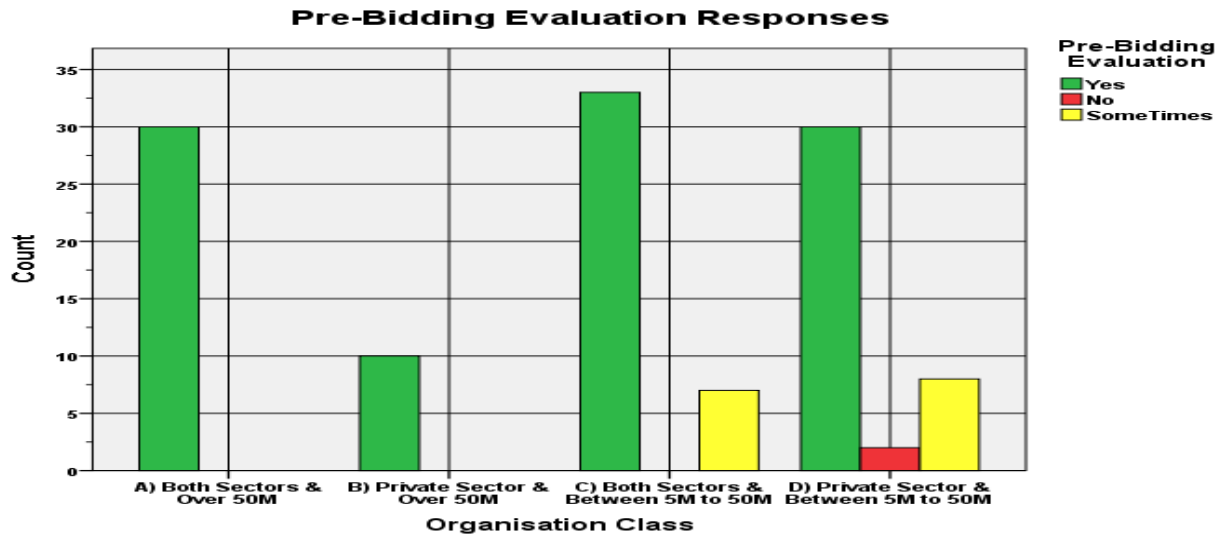
Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.331	.041
	<b>Cramer's V</b>	<b>.234</b>	.041
N of Valid Cases		120	

The test indicates that there is a statistically significant association between the organisation's class and the condition of the pre-bidding evaluation, as the Pearson Chi-Square Sig. value is less than 0.05;  $p = 0.041$  Regarding the strength of association, as Lund and Lund (2013) explain, Phi ( $\phi$ ) and Cramer's V are both measures of the strength of association of a nominal by nominal relationship. Although Phi is not suitable for anything other than 2 x 2 cross-tabulation, Cramer's V can be used for all other cases, and ranges from 0 to +1.

Hence, the strength of association is reasonably acceptable, as Cramer's V = 0.234, which means that a relationship exists between the two variables, including all the categories examined. The next paragraph will shed the light on this subject, based on Table 6.13 and Figure 6.5.

**Table 6.13: Pre-Bidding Evaluation Cross-tabulation**

Organisation Class * Pre-Bidding Evaluation Cross-tabulation						
			Pre-Bidding Evaluation			Total
			Yes	No	Some Times	
Organisation Class	Both Sectors & Over 50M	Count	30	0	0	30
		Std. Residual	.8	-.7	-1.9	
	Private Sector & Over 50M	Count	10	0	0	10
		Std. Residual	.5	-.4	-1.1	
	Both Sectors & Between 5M to 50M	Count	33	0	7	40
		Std. Residual	-.2	-.8	.9	
	Private Sector & Between 5M to 50M	Count	30	2	8	40
		Std. Residual	-.7	1.6	1.3	
Total		Count	103	2	15	120



**Figure 6.5: Bar Chart of Pre-Bidding Evaluation Responses**

The cross-tabulation table above can be used only if the result of the Chi-square test was statistically significant to indicate which cell or cells contributed to the Chi-square Sig. value. The residual, or the difference, between the observed frequency and the expected frequency is a more reliable indicator, especially if the residual is converted to a z-score and compared to a critical value equivalent to the alpha for the problem.

SPSS software prints out the standardized residual (converted to a z-score) computed for each cell, by comparing the size of the standardized residuals to the critical values that correspond to an alpha of 0.05; which should be beyond +/-1.96 to determine which cell(s) could be contributing to the Sig. value. This is equivalent to testing the null

hypothesis that the actual frequency equals the expected frequency for a specific cell, versus the hypothesis of a difference greater than zero (Pallant, 2011).

In the cross-tabulation table above (Table 6.13) there is one cell (-1.9) that seems to be close to contributing to the significant relationship; however there is no specific cell with a value beyond +/-1.96 to indicate which level of the independent variable (organisation class) seems to be accounting the most for a certain level of the dependent variable (pre-bidding evaluation). Notwithstanding, the research can rely on the Chi-square Sig. value and the distribution of answers in the bar chart above (Figure 6.5) to assume that the size of the annual business volume of the organisation (one of the main variables) has contributed to the statistical Sig. value, as the 'No' and 'Sometimes' answers only can be found in the responses of participants from small-to-medium organisations.

Thus, after these results, it can be stated that the majority of contractors' organisations working in the Saudi construction industry consider the pre-bidding evaluation for a potential PPP project as a crucial task to be conducted in order to achieve success for both organisational and project levels; which confirms the findings of the literature review about this subject. Also, this results support this research to achieve its aim for developing a strategic RM decision model in order to help contractor organisation conducting such a task.

### **6.3.3. Pre-Bidding Risk Identification**

From Table 5.12 in the previous chapter, it was seen that the majority of respondents (66.7%) are using negotiation with in-house experts to identify risks before bidding for a proposed project. Such a practice is considered crucial process by these organisations to discover the strength and weakness aspects of the potential project, which helps organisations to assess their capability to conduct the project and then to bid for it.

Despite the response rate mentioned above, it is essential to investigate differences in responses based on the independent variable (the organisations' classes) in order to find out whether there is a statistical relationship between the condition, which is here a nominal scale for pre-bidding risk identification, and the classes' main variables (annual business volume & main client type) with the differences or similarities in the participants' choices/answers. Thus, the tendencies in the behaviour of the participants'

organisations can be established. Both the independent and dependent variables are nominal (categorical) scales, so that the most appropriate statistical analysis test to be applied is the chi-square test for association, for the same reasons discussed in the previous section.

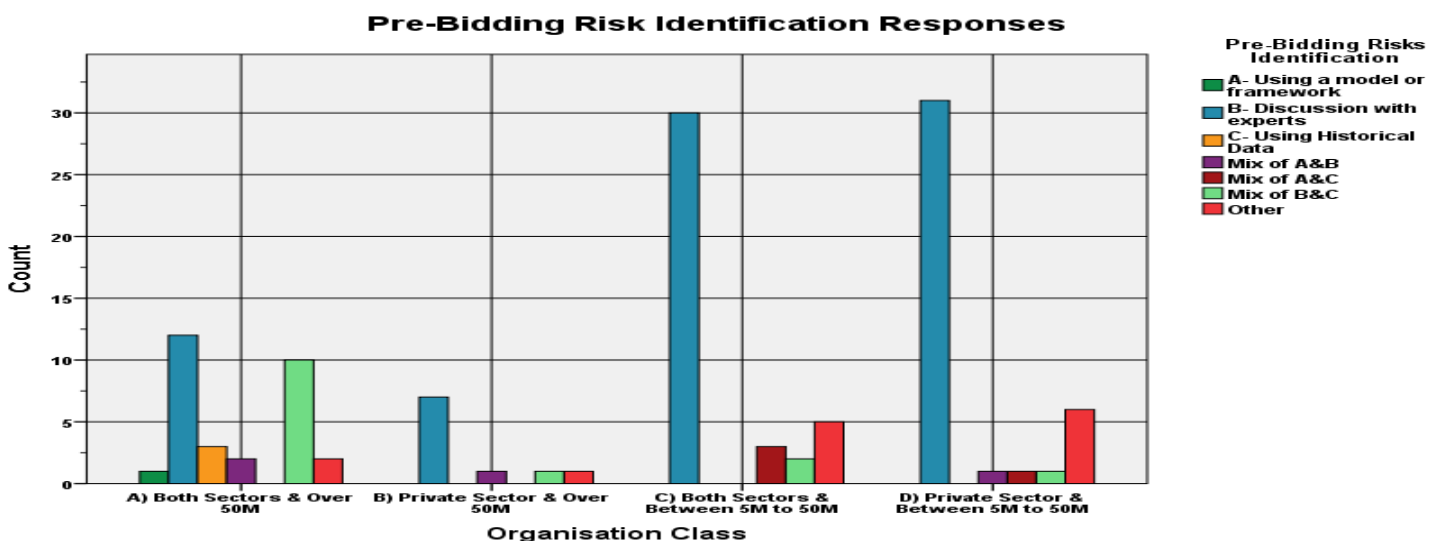
**Table 6.14: Chi-Square Tests of Pre-Bidding Risk Identification**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	41.159 <sup>a</sup>	18	<b>.001</b>
Likelihood Ratio	39.978	18	.002
Linear-by-Linear Association	3.615	1	.057
N of Valid Cases	120		
a. 24 cells (85.7%) have expected count less than 5. The minimum expected count is .08.			

**Table 6.15: Strength of Association of Pre-Bidding Risk Identification**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.586	.001
	<b>Cramer's V</b>	<b>.338</b>	.001
N of Valid Cases		120	

The Chi-square test indicates that there is a statistically significant association between the two variables, the organisation's class and the condition of the pre-bidding risks identification, as the Pearson Chi-Square Sig. value is less than 0.05;  $p = 0.001$ , and that this association is moderately strong, as the strength of this association by Cramer's V = 0.338.



**Figure 6.6: Bar Chart of Pre-Bidding Risk Identification Responses**



**Table 6.16: Pre-Bidding Risk Identification Cross-tabulation**

Organisation Class * Pre-Bidding Risks Identification Cross-tabulation											
		Pre-Bidding Risk Identification							Total		
		A- Using a model or framework	B- Discussion with experts	C- Using Historical Data	Mix of A&B	Mix of A&C	Mix of B&C	Other			
Organisation Class	Both Sectors & Over 50M	Count	1	12	3	2	0	10	2	30	
		Std. Residual	1.5	-1.8	2.6	1.0	-1.0	3.5	-.8		
	Private Sector & Over 50M	Count	0	7	0	1	0	1	1	10	
		Std. Residual	-.3	.1	-.5	1.2	-.6	-.2	-.2		
	Both Sectors & Between 5M to 50M	Count	0	30	0	0	3	2	5	40	
		Std. Residual	-.6	.6	-1.0	-1.2	1.4	-1.2	.2		
	Private Sector & Between 5M to 50M	Count	0	31	0	1	1	1	6	40	
		Std. Residual	-.6	.8	-1.0	-.3	-.3	-1.7	.6		
	Total		Count	1	80	3	4	4	14	14	120

From the cross-tabulation table above (Table 6.16) two cells seem to be contributing most to the Chi-square Sig. value. These cells have introduced values above 1.96 in the group of organisations working in both sectors with annual business volume over than 50 Million in the following categories of the dependent variable: the first value is 2.6 for the choice ‘By using historical data and’ and the second value is 3.5 for the choice ‘by using both Discussion with experts and historical data’. Actually, practically speaking, finding these two cells as the cells contributing most to the Sig. value of association is logically acceptable, as the common aspect between these two categories is the use of historical data.

A common practice for large organisations experienced with both sectors is to be aware of the importance of keeping project records as a learning environment in order to avoid previous failures or obstacles. Thus, using the historical data together with other techniques for evaluating potential projects and identifying risks is an essential practice for successful organisations. As a result, it could be evident that large contractor organisations working in both sectors are making extra effort in order to identify and assess risks for potential PPP projects in the Saudi market. Such an effort reflects the importance of risks identification and its relationship to successful bidding decisions. In contrast, other types of contractor organisations involved in the study should improve their practices towards risks identification for potential PPPs in order to make concrete successful bidding decisions based on facts and rational basis.

### 6.3.4. Organisational Risk Management Maturity Level (RMML)

Table 5.13 in the previous chapter shows that the response rate varied between the four levels of the adopted model for the risk management maturity level. However, the majority of respondents (70%) were between level three and four, the normalised and natural, respectively; it is thus crucial for the benefit of this research to investigate differences in responses based on the independent variable (the organisations' classes) in order to find out whether there is a statistical relationship between the condition, which is here a nominal scale for organisations RMML, and the classes' main variables (annual business volume & main client type) and the differences in the participants' choices/answers. Thus, the tendencies in the behaviour of the participants' organisations can be established.

Both the independent and dependent variables are nominal (categorical) scales, so that the most appropriate statistical analysis test to be applied is the chi-square test for association. This result will enhance the credibility and confidence in this research regarding the ability of respondents to assess the factors affecting the bid/no bid decision in the third section of the questionnaire survey.

**Table 6.17: Chi-Square Tests of Organisational RMML**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	20.682 <sup>a</sup>	9	.014
Likelihood Ratio	23.398	9	.005
Linear-by-Linear Association	8.952	1	.003
N of Valid Cases	120		

a. 7 cells (43.8%) have expected count less than 5. The minimum expected count is .42.

**Table 6.18: Strength of Association of Organisational RMML**

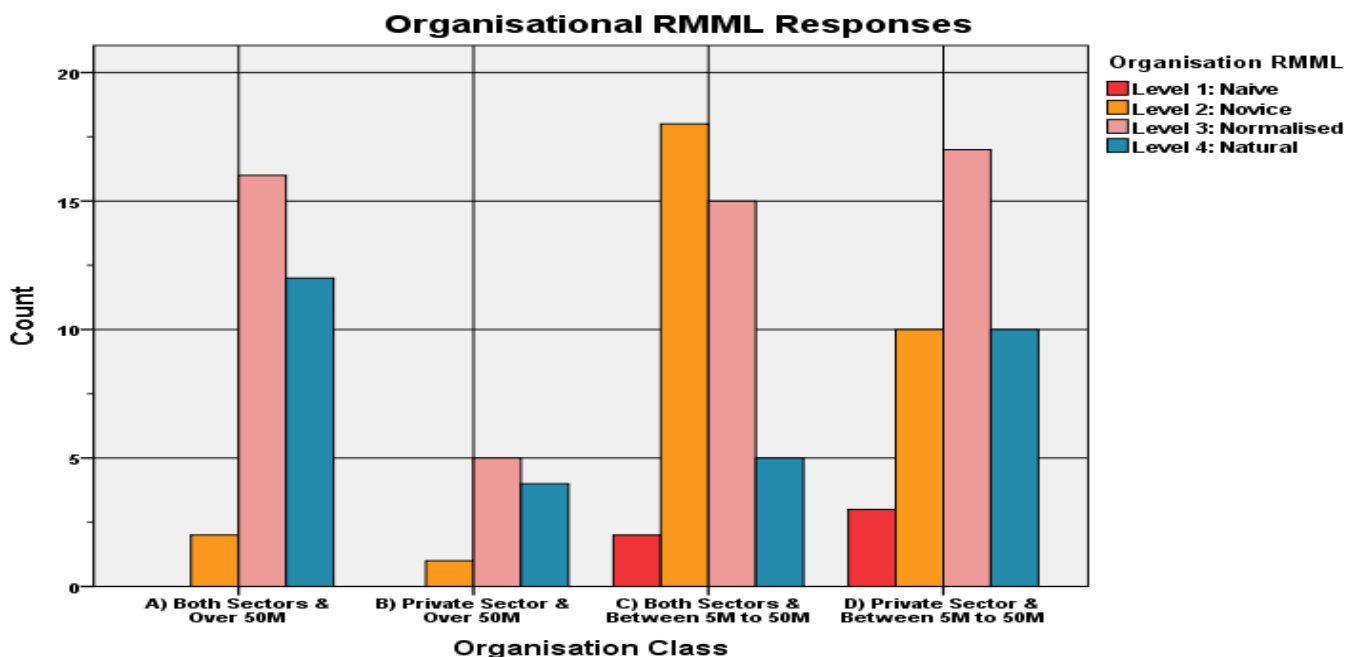
Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.415	.014
	<b>Cramer's V</b>	.240	.014
N of Valid Cases		120	

The Chi-square test above indicates that there is a statistically significant association between the two variables, the organisation's class and the condition of the organisational RMML, as the Pearson Chi-Square Sig. value is less than 0.05;  $p = 0.014$  And there is a

considerable strength association as the strength of this association by Cramer's  $V = 0.240$ .

**Table 6.19: Organisational RMML Cross-tabulation**

Organisation Class * Organisational RMML Cross-tabulation							
		Organisation RMML				Total	
		Level 1: Naïve	Level 2: Novice	Level 3: Normalised	Level 4: Natural		
Organisation Class	Both Sectors & Over 50M	Count	0	2	16	12	30
		Std. Residual	-1.1	-2.1	.8	1.5	
	Private Sector & Over 50M	Count	0	1	5	4	10
		Std. Residual	-0.6	-1.0	.3	.9	
	Both Sectors & Between 5M to 50M	Count	2	18	15	5	40
		Std. Residual	.3	2.4	-0.6	-1.7	
	Private Sector & Between 5M to 50M	Count	3	10	17	10	40
		Std. Residual	1.0	-0.1	-0.2	-0.1	
Total		Count	5	31	53	31	120



**Figure 6.7: Bar Chart of Organisational RMML Responses**

Table 6.19 is used to determine which cells seem to be contributing to the statistically significant value of the association existing between the organisation's group main variables and the organisational RMML. The contingency table shows that there are two cells accounting the most, and both of them are for level 2: Novice in organisational

RMML (the condition examined or the dependent variable in this test). These two cells also belong to two different categories of the independent variable (the organisation class/group); however both categories contain organisations working in both sectors, the difference here is the annual business volume. These two cells represent 2 organisations over 50 Million and 18 organisations between 5 Million to 50 Million. It would be expected to find small to medium organisations at this low level of RMML, but it is surprising to find organisations with such a huge annual volume in this level. This result is supporting arguments calling for an extra attention towards risk management tools and techniques and emphasising RM important role for identifying risks of PPP projects, and also emphasising the importance of the relationship between RM and successful bidding decisions.

However, such a result supports the discussion in the literature about the need of risk management awareness and tools and techniques in order to achieve success and to avoid 'unhappy surprises'. Also, the bar chart in Figure 6.7 above demonstrates that the level one of the RMML model 'naïve' can be found only in responses regarding small-to-medium organisations, while the second level 'novice' is significantly found in the same group (annual volume between 5 Million to 50 Million), compared to the numbers for other groups. This requires attention and risk management support for evaluating potential PPP projects and identifying risks for immature PPP Saudi market, as will be proven next.

### **6.3.5. Necessity of Using a Bid/No Bid Decision Model**

According to Table 5.14 in the previous chapter, the great majority of participants, a total of 97 out of 120 (80.8%), believe that their organisations are in need of or can benefit from a bid/no bid decision model in order to evaluate proposed projects before entering the bidding stage. This result provides further positive motivation for this research, as it provides a further indication of the need for an aid to help contractors' organisations to make their bid/no bid decision accurately in order to achieve project success.

However, it is intended to investigate the differences in responses based on the independent variable (the organisations' classes) in order to find out whether there is a statistical relationship between the condition, which is here a nominal scale for necessity of using a bid/no bid decision model, and the classes' main variables (annual business

volume & main client type) based on the differences in the participants' choices/answers. Thus, the tendencies in the behaviour of the participants' organisations can be established. Both the independent and dependent variables are nominal (categorical) scales, so that the most appropriate statistical analysis test to be applied is the Chi-square test for association.

**Table 6.20: Chi-Square Tests of Necessity of Using a Bid/No Bid Decision Model**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	14.552 <sup>a</sup>	6	.024
Likelihood Ratio	14.608	6	.024
Linear-by-Linear Association	6.371	1	.012
N of Valid Cases	120		

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is .25.

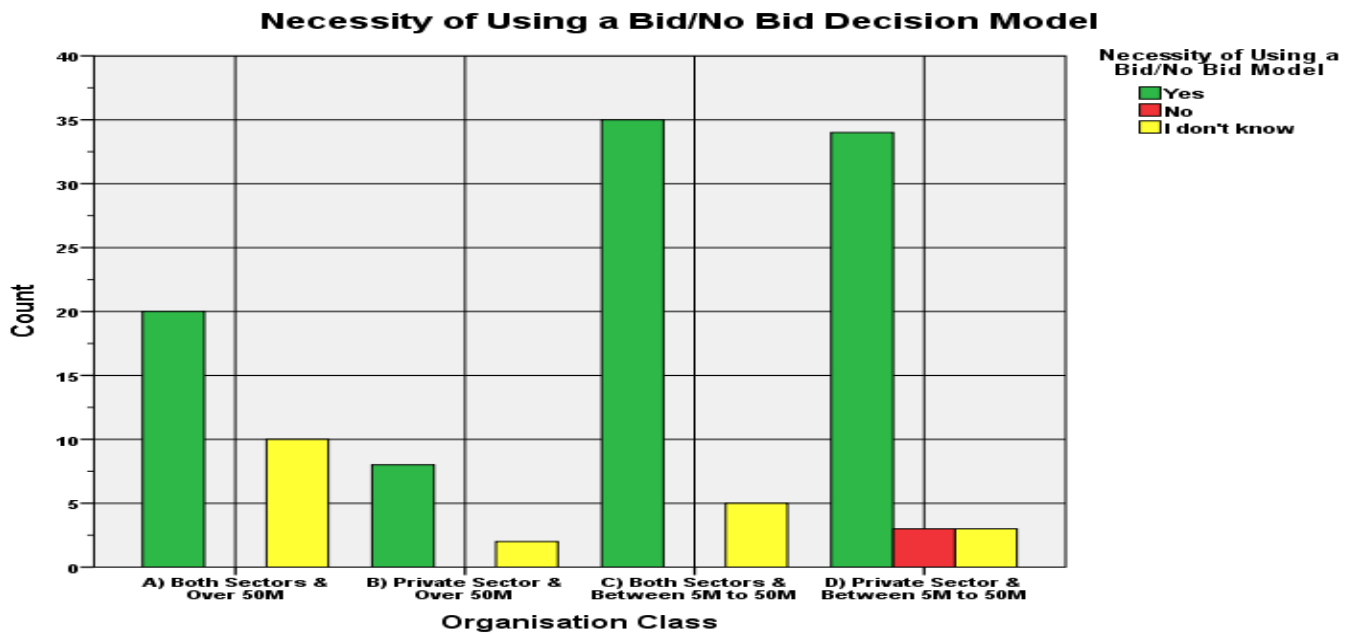
**Table 6.21: Strength of Association of Necessity of Using a Bid/No Bid Decision Model**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.348	.024
	<b>Cramer's V</b>	<b>.246</b>	.024
N of Valid Cases		120	

The Chi-square test above shows that there is a statistically significant association /relationship between the two variables, the organisation's class/group and the condition of the necessity of using a bid/no bid decision model, as the Pearson Chi-Square Sig. value is less than 0.05;  $p = 0.024$ . Also, there is a strong association, as the strength of this association by Cramer's  $V = 0.246$ . Thus the standardised residual value in the cross-tabulation table can be useful to discover which cells help such a relationship to occur.

**Table 6.22: Necessity of Using a Bid/No Bid Decision Model: Cross-tabulation**

Organisation Class * Necessity of Using Model; Cross-tabulation						
		Necessity of Using Model			Total	
		Yes	No	I don't know		
Organisation Class	Both Sectors & Over 50M	Count	20	0	10	30
		Std. Residual	-9	-9	2.2	
	Private Sector & Over 50M	Count	8	0	2	10
		Std. Residual	.0	-.5	.3	
	Both Sectors & Between 5M to 50M	Count	35	0	5	40
		Std. Residual	.5	-1.0	-.6	
Private Sector & Between 5M to 50M	Count	34	3	3	40	
	Std. Residual	.3	2.0	-1.4		
Total		Count	97	3	20	120



**Figure 6.8: Bar Chart of Responses for Necessity of Using a Bid/No Bid Decision Model**

Table 7.22 is used to determine which cells seem to be contributed to the statistically significant value of the association existing between the organisation's group main variables and the dependent variable (necessity of using a bid/no bid decision model). In other words, which level of the independent variable seems to be accounting the most for a certain level of the dependent variable? It is found that there are two cells as follows: i) the group of both sectors & over 50 M., where 10 participants chose the I don't know answer, and ii) the group of Private sector & between 5 M to 50 M., where 3 participants chose the No answer. However, the differences between responses are considered and the high response rate for the need of an aid to support the bid/no bid decision, as can be seen from Figure 6.8, is a motivating factor to achieve the research aim.

### 6.3.6. Necessity of Covering Risks in the Bid/No Bid Decision Model

From the output shown in Table 5.15 in the previous chapter, ninety-six respondents (80%) agreed that, for better potential project evaluation, the decision model should take into account the organisation's current situation with risk identification. Clearly, a significant majority of respondents embrace the adoption of this research objectives in order to create a bid/no bid decision model with the feature of analysing the contractor's current situation in addition to the other features for a critical and logical decision.

Still, it is necessary to investigate the differences in responses based on the independent variable (the organisations' classes) in order to find out whether there is a statistical relationship between the condition, which is here a nominal scale for the necessity of covering risks in the bid/no bid decision model, and the classes' main variables (annual business volume & main client type) based on the differences in the participants' choices/answers. Also, as the previous section, both the independent and dependent variables are nominal (categorical) scales, meaning that the most appropriate statistical analysis test is the Chi-square.

**Table 6.23: Chi-Square Tests of Necessity of Covering Risks in the Bid/No Bid Decision Model**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	15.246 <sup>a</sup>	6	<b>.018</b>
Likelihood Ratio	15.497	6	.017
Linear-by-Linear Association	6.924	1	.009
N of Valid Cases	120		

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is .25.

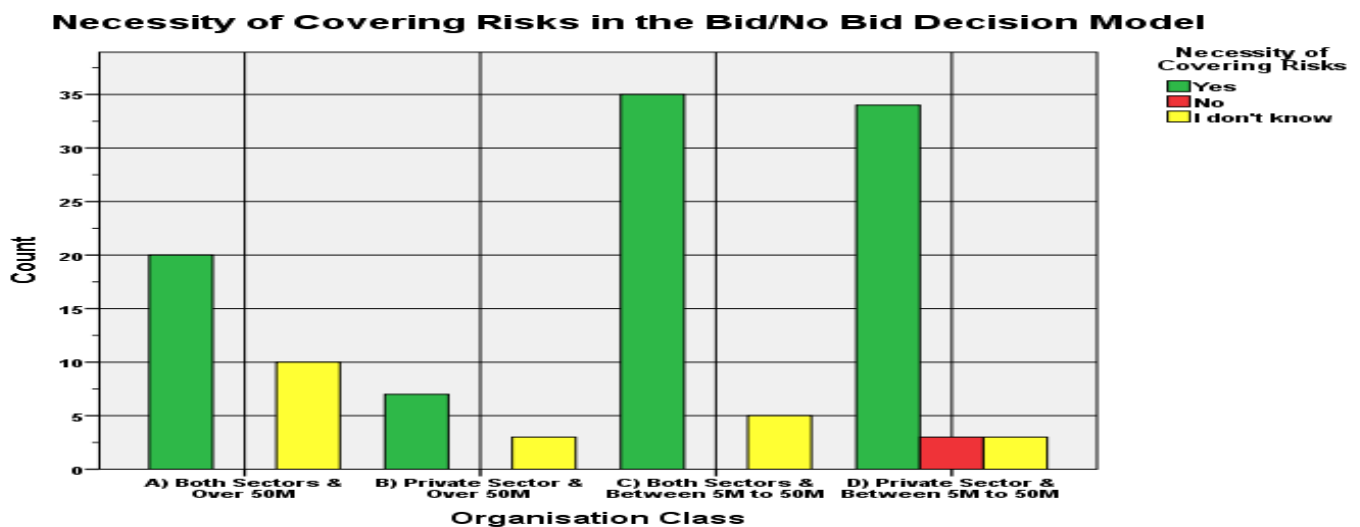
**Table 6.24: Strength of Association of Necessity of Covering Risks in the Bid/No Bid Decision Model**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.356	.018
	<b>Cramer's V</b>	<b>.252</b>	<b>.018</b>
N of Valid Cases		120	

The Chi-square test shows that there is a statistically significant association/relationship between the two variables, the organisation's class/group and the condition of the necessity of covering risks in the bid/no bid decision model, as the Pearson Chi-Square Sig. value is less than 0.05;  $p = 0.018$  and a strong association, as Cramer's V = 0.252. Thus the standardised residual value in the cross-tabulation table can be useful to discover which cells help such a relationship to be present.

**Table 6.25: Necessity of Covering Risks in the Bid/No Bid Decision Model Cross-tabulation**

Organisation Class * Necessity of Covering Risks Cross-tabulation						
			Necessity of Covering Risks			Total
			Yes	No	I don't know	
Organisation Class	Both Sectors & Over 50M	Count	20	0	10	30
		Std. Residual	-.8	-.9	2.1	
	Private Sector & Over 50M	Count	7	0	3	10
		Std. Residual	-.4	-.5	.9	
	Both Sectors & Between 5M to 50M	Count	35	0	5	40
		Std. Residual	.5	-1.0	-.8	
	Private Sector & Between 5M to 50M	Count	34	3	3	40
		Std. Residual	.4	2.0	-1.5	
Total	Count	96	3	21	120	



**Figure 6.9: Bar Chart of Responses for Necessity of Covering Risks in the Bid/No Bid Decision Model**

The cross-tabulation table above used to determine which cells seem to be contributing to the statistically significant value of the association exist between the organisation's group main variables and the dependent variable (necessity of covering risks in the bid/no bid decision model). In other words, which level of the independent variable seems to be accounting the most for a certain level of the dependent variable? It is found that there are two cells, similar to those in the previous section: i) the group of Both sectors & over 50 M., where 10 participants chose the I don't know answer, and ii) the group of Private sector & between 5 M to 50 M., where 3 participants chose the No answer. However, the differences between responses are considered, and the high response rate for the importance of considering the organisation's current situation with the proper evaluation for potential PPP projects in the Saudi market with rational risk identification for bid/no



bid decisions, as can be seen from the positive responses in Figure 6.9, is another motivator to achieve the research aim and objectives.

### 6.3.7. Model's Contribution to Success

Table 5.16 in the previous chapter shows that ninety-seven respondents (80.8%) did confirm that they believed creating such a model would contribute to improve risk management performance and help organisations to achieve projects success. This result confidently confirms the need for a rational decision model to help contractors' organisations to make their bid/no bid decision correctly in order to achieve project success.

However, it is necessary to investigate the differences in responses based on the independent variable (the organisations' classes) in order to find out whether there is a statistical relationship between the condition, which is here a nominal scale for the model's contribution to success, and the classes' main variables (annual business volume & main client type) based on the differences in the participants' choices/answers. Also, as the previous section, both the independent and dependent variables are nominal (categorical) scales, so that the most appropriate statistical analysis test is the Chi-square test for association.

**Table 6.26: Chi-Square Tests of Model's Contribution to Success**

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	13.587 <sup>a</sup>	6	<b>.035</b>
Likelihood Ratio	13.938	6	.030
Linear-by-Linear Association	5.364	1	.021
N of Valid Cases	120		
a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is .25.			

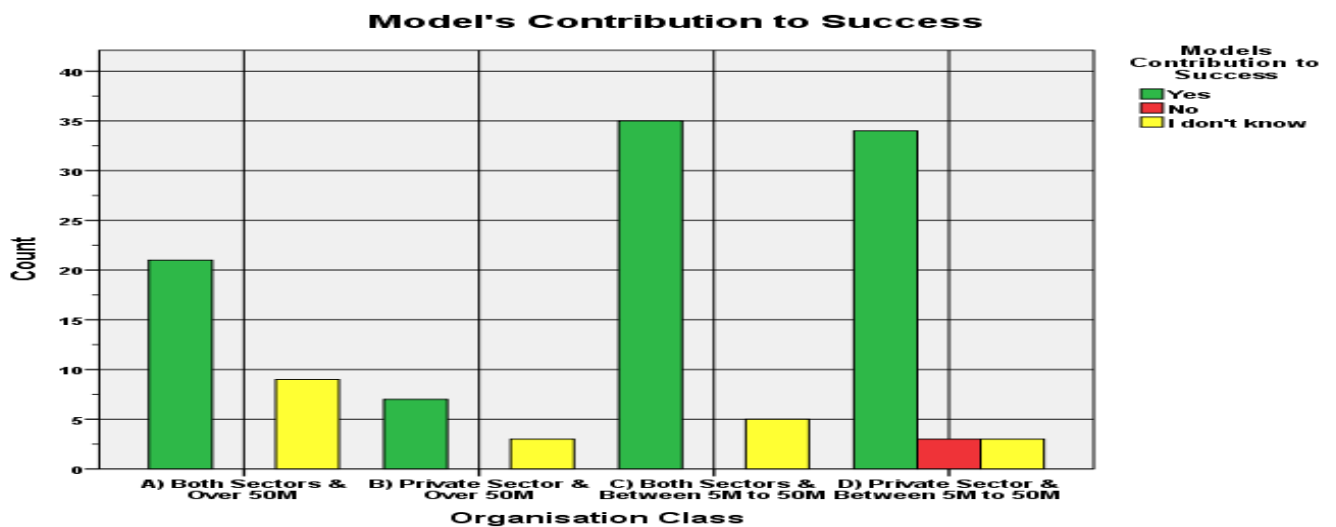
**Table 6.27: Strength of Association of Model's Contribution to Success**

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.336	.035
	<b>Cramer's V</b>	<b>.238</b>	<b>.035</b>
N of Valid Cases		120	

The Chi-square test result above shows that there is a statistically significant association or relationship between the two variables, the organisation's class/group and the condition of the model's contribution to success, as the Pearson Chi-Square Sig. value is less than 0.05;  $p = 0.035$  and the association is moderately strong, as Cramer's  $V = 0.238$ . Thus the standardised residual value in the cross-tabulation table can help to discover which cells help such a relationship to be present.

**Table 6.28: Model's Contribution to Success Cross-tabulation**

Organisation Class * Model's Contribution to Success Cross-tabulation						
			Models Contribution to Success			Total
			Yes	No	I don't know	
Organisation Class	Both Sectors & Over 50M	Count	21	0	9	30
		Std. Residual	-.7	-.9	1.8	
	Private Sector & Over 50M	Count	7	0	3	10
		Std. Residual	-.4	-.5	1.0	
	Both Sectors & Between 5M to 50M	Count	35	0	5	40
		Std. Residual	.5	-1.0	-.6	
	Private Sector & Between 5M to 50M	Count	34	3	3	40
		Std. Residual	.3	2.0	-1.4	
Total	Count	97	3	20	120	



**Figure 6.10: Bar Chart of Responses for Model's Contribution to Success**

The contingency table above identifies one cell with a value above 1.96 and which seems to be contributing more than other cells to the Chi-square Sig. value. This cell belong to the group Private Sector & Between 5M to 50M of the independent variable, in which three participants chose the 'No' answer for the dependent variable. From Figure 6.10, it

can be seen that there are only three out of 120 participants who chose the No answer, which confirms that the majority of participants would appreciate the creation of this model for better potential PPP projects evaluation and rational risk identification in the Saudi Arabian construction industry. This would lead to an accurate and more effective decision regarding a bid/no bid investment decision for PPP projects.

#### **6.4. Differences in Responses Regarding the Factors Affecting Bid/No Bid Decisions**

This section will present the analytical results of the third section in the questionnaire survey, which is related to investigating the difference in behaviour of participating contractors' organisations regarding ranking the importance level of the factors that could affect the bid/no bid decisions. This investigation will be based on the nominal scale of the organisation's class/group as the independent variable, which consists of two main variables, the main client type and the annual business volume, and the seventy-seven factors as the dependent variable, which is here a continuous Likert scale for each factors' weight of importance. Therefore, in this situation, the most appropriate statistical analysis test to be applied is the analysis of variance (ANOVA); as it is concerned with comparing the mean scores of more than two groups/classes. In particular, the one-way ANOVA is so called, as explained above, it is capable of comparing the variance between the different groups/classes with the variability within each of the groups/classes (Pallant, 2011).

Hence, as discussed in section 6.3.1, there are six assumptions for ANOVA test, and due to the violation in the normality assumption (as shown in Table 5.2: Test of Normality) in addition to the violation in the homogeneity assumption for most of the factors; the modified Welch ANOVA will be applied, with the Games-Howell post hoc test. The Games-Howell post hoc test is a useful test to compare all possible combinations of group differences when the assumption of homogeneity of variances is violated, as it provides confidence intervals for the differences between group means and shows where the differences are statistically significant (Lund and Lund, 2013).

The Table 5.1: Factors Affecting Bid/No Bid Decisions in the previous chapter presents all the seventy-seven factors investigated in the questionnaire survey; however, after applying the modified ANOVA test, only forty-four factors scored Sig. values less than 0.05, which indicates that there are statistically significant differences between the means of the independent groups. In other words, the behaviour of the participants' organisations differs significantly regarding these factors. These factors with their Welch ANOVA Sig. values are shown in Table 6.29.

**Table 6.29: Factors' scoring statistically significant values in Welch ANOVA Test**

<b>Robust Tests of Equality of Means: Welch ANOVA Test</b>		
<b>Code</b>	<b>Factor Description</b>	<b>Sig.</b>
<b>Category: The Contractor's Current Situation</b>		
F4	Considering the condition of labour availability	.001
F5	Considering the organisation's financial situation	.000
<b>Category: Project Characteristics</b>		
F6	Considering the level of acceptance of the project's size in Saudi Riyal	.000
F7	Considering the location of the project	.000
F8	Compatibility of the organisation's type of work with the type/nature of the project	.000
F9	Considering the level of acceptance of the project's duration	.000
F10	Considering the past experience with similar projects	.002
<b>Category: Client Characteristics</b>		
F12	Considering the client's financial capacity	.037
F13	Considering the ability of client to provide a financial guarantee	.024
<b>Category: Bidding Situation</b>		
F22	Considering the scope of work required to enter the bid	.021
<b>Category: PPP Success Factors</b>		
F25	Considering the early implementation of partnering relationship	.041
F27	Unifying a specific vision with partners	.000
F29	Consideration of applying open communication and trust between partners	.003
F30	Willingness of partners to compromise and collaborate	.000
F31	Level of respect between partners	.000
F34	Considering the adoption of local and global expert advice and review for the proposed project in the targeted country	.000
F35	Considering risk awareness in general for the proposed project and the targeted relationship	.000
F38	Taking into consideration local and/or global subcontractors' involvement for conducting the proposed project	.000
F39	Considering the innovation capability in the targeted relationship	.010
F40	Considering the availability of a conflict resolution strategy for the targeted relationship	.002
<b>Category: International Investment Success Factors</b>		
F41	Considering the economic stability of the targeted country of project	.000

F42	Consideration of predictable political risks of the country such as visa restrictions and customs constraints	.007
F46	Understanding the cultural variables allied with all project stakeholders; and the adaptation of new management skills and techniques in order to accommodate them	.034
<b>Category: Tender Criteria</b>		
F51	The accuracy of bill of quantity provided by the client	.001
F52	The accuracy of the original cost estimated by the client	.006
F53	Clarity of the work and specifications needed for the project	.027
F54	Clarity of quality scope required for the project	.004
F55	Level of completeness of project's design	.000
F56	The accuracy of the cost estimated by the contractor	.001
F57	Degree of possible alternative design to reduce the project cost if allowed	.000
F58	Considering the possibility of additional work needed for fulfilling the project	.000
F59	Considering the use of nominated subcontractors requested by the client	.000
F60	Considering safety hazards	.000
F61	Level of availability of resources and manpower	.000
F62	Supply chain management consideration	.000
F63	Level of familiarity with site condition	.003
F65	Reputation of the management consultant appointed by the client	.000
F66	Considering the project management system required to conduct the project	.000
F67	Considering the project supervision procedure for the targeted relationship	.012
F68	Considering the Governmental division requirements	.000
F69	Considering the adequacy of advance payment provided by client if existed	.022
F72	Considering general office overheads	.000
F73	Considering the easiness of obtaining a bank loan if needed	.001
F74	Degree of satisfaction on the expected profit	.000
a. Asymptotically F distributed.		

The Games-Howell post hoc test generated seventy-seven tables for comparison, and regarding the forty-four factors which score statistical significant values, the differences were found to be between the large organisations and the small-to-medium organisations, in general, where some factors were considered to be more important to medium organisations compared to the weight of importance attached by respondents from large organisations. Also, some factors seem to be more important for private sector organisations than for organisations operating in both sectors, where the experience of dealing with a public client plays a major role for organisations operating in both sectors, in addition to the financial situation or the annual business volume.

The importance and need for considering these key risk factors is discussed in the literature chapter, recognised and emphasised in the qualitative research strand chapter, and ranked in the quantitative research chapter. The aim of this current statistical analysis is to distinguish the different behaviours of participants' contractor organisations towards the importance level of each factor investigated in order to consider these differences when designing the research output, which is a strategic risk management decision model for PPP projects in the Saudi construction industry, to be capable of simulating the real practices of decision making processes as recommended in the literature review.

Thus, these differences in responses, which emerged from the post hoc test, necessitate taking into account the existence of differences in weight of importance when constructing the decision model, as will be clarified in the next chapter on the model's design. For this reason, in order to provide a rational model for bid/no bid decisions, the class of an organisation will be identified in the construction phase of the model and by then the exact weights of importance of the factors affecting the bidding decisions for each class are applied.

## **6.5. Summary of Chapter Six**

This chapter has presented the statistical analysis of the questionnaire survey, which is required to investigate different behaviours of the participants in parallel with their differences, in terms of their organisations' features, that is, the classification status, type of work, annual business volume, and the main client type. Generally, the findings of the statistical analysis have contributed to the study aim and objectives and, in particular, to the following objectives: investigating the different behaviours of contractor's organisations during the process of decision-making, investigating the link between organisations' RM practice and decision making processes, and investigating the need for a rational RM strategic decision model for PPP projects. And also, confirmed the findings of the literature chapter regarding the importance of risk management tools and techniques and its link to successful bid/no bid decisions for potential PPP projects in the Saudi market.

The statistical analysis identified the different behaviours between the contractor organisations' participants based on the identified main variables applied to distinguish participants' responses, which are the type of the main client and the size of the annual business volume. While all participants' organisations are classified and working in the area of construction, the statistical analysis identified different behaviours towards bidding decisions for PPP projects in the Saudi market between organisations operating only in the private sector and those operating in both sectors, and also between medium-to-large organisations.

Statistical results reveal that large organisations operating in both sectors are practising risk management as 'the effective way of surviving and achieving success' and they appreciate all available the knowledge and/or tools to discover PPPs risks and evaluate potential projects in the Saudi market in order to make the right bidding decisions and to compete with their competitors. Large private sector organisations have similar behaviour to the large both sectors organisations, but they differ in relation to financial, experience with public clients, and working overseas factors, as liquidity insurance (availability) and known-stable environment are their sources of strength.

Moreover, the statistical results show that medium organisations in general have many weak aspects, due to the lack of practice with risk management tools and techniques, especially for potential PPP projects in the Saudi market. Hence, project selection, project evaluation, and risk identification, in addition to the maturity level of their organisations in general can be considered as their weakest aspects that lead to inaccurate bidding decisions and project failure as well.

Regarding the need of a strategic risk management decision model for PPP projects, the statistical analysis found that the majority of participants, especially medium contractor organisations look forward to having such a model in order to evaluate projects and identify risks before the bidding stage. The majority of respondents emphasised the importance of and the need for an effective web-based model that organises the bid/no bid decision in a rational, logical, flexible and user-friendly manner, with consideration of the risks and success factors of PPPs, and also the success factors of international investment, with a linkage to the contractor organisation's strategy and current situation to be covered in the desired model for rational and effective decisions.

To sum up, these findings help the research to distinguish the behaviours of different sized organisations with different main type of clients, in order to consider these differences for the construction phase of the desired model in order to simulate practical situations. In addition, the findings will help to configure the final concept of the model to be designed and applied in the next chapter.



## CHAPTER 7: MODEL DEVELOPMENT, VALIDATION, AND EVALUATION

*“One thing is sure: nothing is certain except uncertainty. Prediction is always hard, especially about the future” (Hillson, 2010).*

### 7.1. Introduction

After analysing the data collected, from both qualitative and quantitative strands, this chapter sets out phase four of the research design. This phase includes constructing the web-based model, which is then to be evaluated through validity responses for the following purposes: to gather participants’ opinions and feedback, to examine the model’s effectiveness, and to validate the model’s final concept. The previous chapters have identified the factors affecting the bid/no bid decision that are applicable to the Saudi Arabian construction industry. Also, observations have been obtained in terms of how bid/no bid decisions are taken in practice and how they are influenced by an organisation’s strategy and its current situation. This chapter presents the proposed model’s development phase, including the modelling procedures according to the findings and recommendations of the previous phases of this research.

The development of a strategic risk management decision model in the form of a web-based application aspires to yield significant benefits to the contractor organisations, and then to the entire industry as a result of the development of a key tool to improve better practice performance for risk management at the strategic level of an international PPP project. In addition, this chapter explains the development process of the web-based application aimed to help international contractor organisations to make rational and effective strategic bid/no bid decisions, taking into consideration the contractor organisation’s size and experience with public clients. Finally, this chapter discusses the validation process and evaluation results.

## 7.2. Development of the Conceptual Model

After evaluating the initial concept of the model through the qualitative research strand, and after analysing the data collected via the quantitative research strand, the final concept of the model is developed to fill the gaps identified in the thesis. In particular, in order to be constructed on a rational basis, the development of the model, takes into account the following objectives:

- ❖ To link the organisation's strategy with its bid-making processes;
- ❖ to assess the organisation's current situation for an accurate and concrete bid/no bid decision;
- ❖ To be a suitable model for small, medium, and large contractor organisations;
- ❖ To be a suitable model for organisations inexperienced with the public sector;
- ❖ To consider key risk factors that affect bid/no bid decisions for large sized construction projects;
- ❖ To consider critical success factors for public private partnership projects; and
- ❖ To consider critical success factors for international construction.

Thus, after achieving the research design previous phases, identifying the relevant factors, and evaluating the initial concept of the model, Figure 7.1 presents the thesis model. The user is required to input the suitable choice in each phase, which best describes his organisation's situation, in parallel with the new project information, and to consider and assess the critical factors in each phase. However, further explanations for each phase will be discussed in the web-based model development section. The concept of the model consists of five phases as follows:

**Phase One:** 'Identifying the organisation'. The main purpose of this phase is to investigate the main variables in this model, which are the contractor organisation's size and main type of clients, , in order to classify the organisation's size and experience with public; and then to apply the appropriate weight of importance for the critical factors for the following phases.

**Phase Two:** 'Assessing the organisation's strategy and current situation'. The main goal of this phase it to link the organisation's strategy with its project selection decision, and

to evaluate the organisation's current situation, based on the information available from the invitation letter to the proposed project, in order to make a rational and logical project selection decision.

**Phase Three:** 'Assessing the proposed project after the invitation letter'. After considering the organisation's strategy and current situation, this phase concerns investigating the proposed project, based also on the information gathered from the invitation letter, in order to make the right decision in terms of buying the bid documents or not. Thus, the strategic criteria that link the organisation's strategy with its decision-making processes will provide set of factors for each criterion to be considered and evaluated by the user for a buy/not to buy decision for the bid document of the proposed project. There are five criteria to be investigated in this phase: Project Characteristics, Client Characteristics, Bidding Situation, in addition to considering PPP and International Construction Critical Success Factors.

**Critical Pre-Bid Phase:** 'Assessment of mandatory factors'. This is a critical phase located between the buy/not to buy and bid/not to bid decisions, which is placed after buying the bid document and before making a bid or not decision for the proposed project. In this phase, after buying the bid document and based on the information gathered from the bid document, an assessment of must-be-secured factors will be considered in order to proceed with confidence to the next phase. These critical mandatory factors are linked directly to the final bidding decision, where the failure in achieving one or more of these critical factors will directly and negatively affect the bid/no bid decision. In particular, these critical mandatory factors are the five highest-ranked factors affecting the bid/no bid decision that were shown in Table 5.17.

**Phase Four:** 'Assessing the proposed project after the bid document. After completing the pre-bid phase, this final phase concerns investigating the proposed project based on the information gathered from the bid document in order to make an effective and concrete bid/no bid decision for the proposed project. Thus, critical factors belonging to the Tender criterion will be considered and evaluated by the user to make a successful decision for the proposed project. Furthermore, the final decision will be accompanied with a confidence level rating to support the decision.

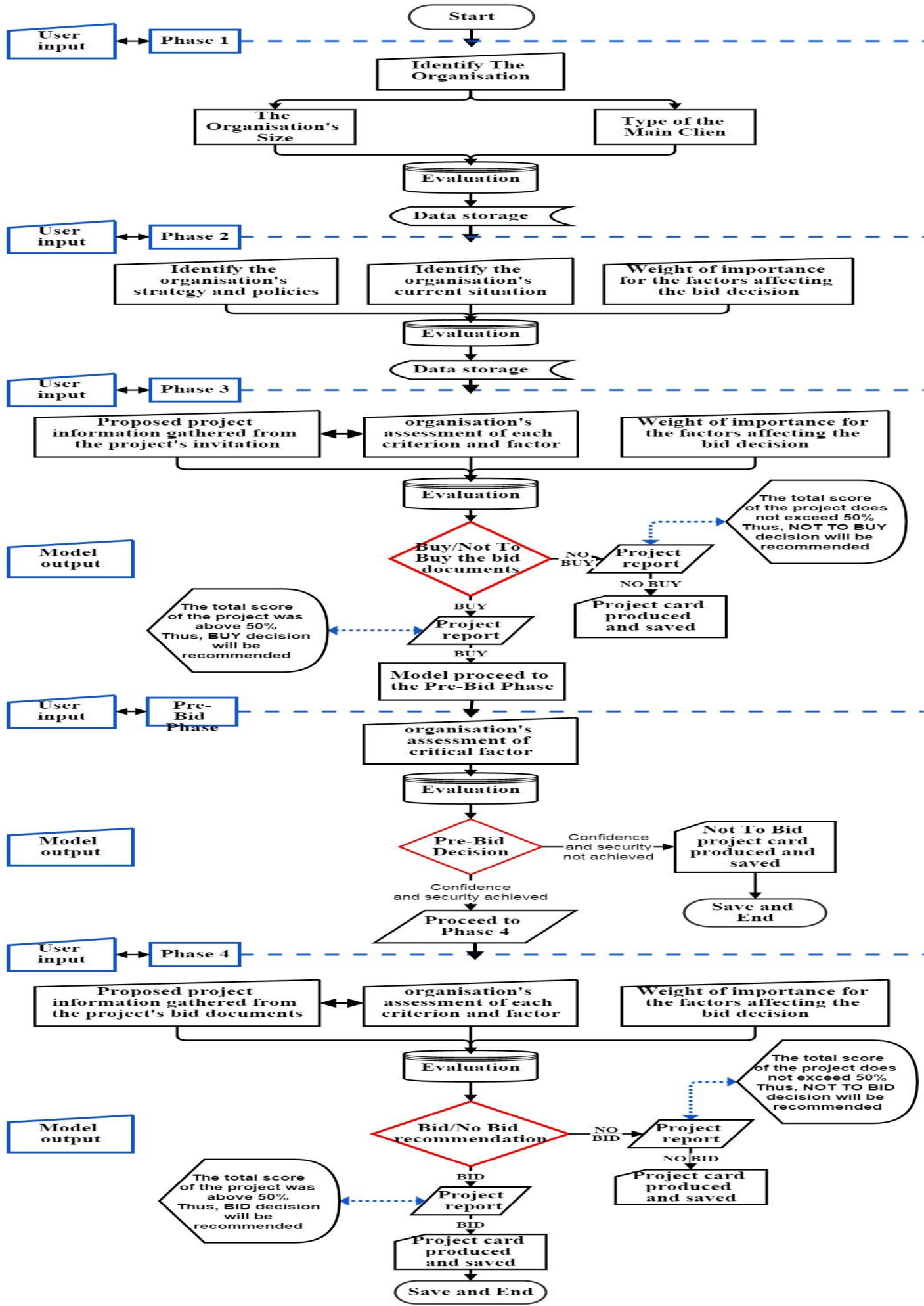


Figure 7.1: The Thesis Model

### **7.3. Development of the Web-Based Model**

The prime aim of this research is to provide a strategic investment decision model, from the perspective of risk management, for international contractors who intend to invest in public private partnership projects in the Saudi Arabian construction industry. Thus, in order to achieve this aim, a web-based model has been developed to gather participants' opinions and feedback, to examine the model's effectiveness and to validate the model's final concept. Hence, the following subsections will explain the model's online design and processes.

#### **7.3.1. Web-Based Model Design and Programming Languages**

The online model is designed based on the function of the parametric design process, which is, according to Jabi (2013), a process based on algorithmic thinking that enables the expression of parameters and rules that together define, encode and clarify the relationship between design intent and design response. Thus, in order to design a smart and dynamic model that is capable of analysing input data, evaluating the data, and generating outputs in the form of recommendations, the smartest programming languages are used to design the web-based model. These programming languages are the Visual Basic .NET (VB.NET) and Active Server Pages (ASP.NET), while the Microsoft SQL Server has been used as database management system for the online model.

The Visual Basic .NET (VB.NET) is a multi-paradigm, high level programming language, implemented on the Microsoft .NET Framework. The VB.NET uses statements to specify actions, where the most common statement is an expression statement, consisting of an expression to be evaluated, on a single line. As part of that evaluation, functions or subroutines may be called and variables may be assigned new values (MSDN, 2014a).

ASP.NET is an open-source server-side Web application framework designed for Web development to produce dynamic Web pages. It was developed by Microsoft to allow programmers to build dynamic web sites, web applications and web services. ASP.NET is built on the Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language (MSDN, 2014b).

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications, which may run either on the same computer or on another computer across a network, including the Internet (MSDN, 2014c).

### **7.3.2. Identification of the Model's Users**

One of the advantages considered when designing the model is its capability to classify the model's user in terms of the organisation's size and the main type client, in order to make a useful model that can help different sized organisations.

Based on the main findings of the analysis of the questionnaire survey (Sections 6.3 and 6.4), there are statistically significant differences in the responses regarding the organisations' behaviour towards bid/no bid decisions based on the organisation's class, and also differences in responses regarding the factors affecting bid/no bid decisions. Thus, the initial classification of the model's user is perceived to be crucial in the modelling procedure; as it will affect the weight of importance of the factors considered to affect the bid/no bid decision. Hence, the model is designed to identify the application's user based on the classes identified in Table 6.1 in terms of the size and the main client type of the contractor organisation as follows:

- A. Both Sectors & Over 50M SR;
- B. Private Sector & Over 50M SR;
- C. Both Sectors & Between 5M to 50M SR; and
- D. Private Sector & Between 5M to 50M SR.

Thus, there are four different weights of importance for each factor that will be called, based on the above classes. The weight of importance for each factor will be calculated by using equation (2), as shown in section 5.7.3.1, for the determination of the importance indices of the seventy-seven factors affecting bid/no bid decisions.

### 7.3.3. The Mathematical Equations Applied for the Web-Based Model

The development of the bid/no bid decision model started with development of a set of mathematical equations to produce a profile for each of the considered factors to calculate their contribution in: a) buying the bid documents; b) the overall bidding decision. Thus, the aim of the mathematical equations is to calculate the following:

- 1) The Contributed Level of Importance (CLI) of each of the factors considered in both decisions (buy/not to buy the bid's documents and the overall bid/not to bid decision);
- 2) The Contributed Weight of Effect (CWE) of each factor considered in both decisions;
- 3) Project Score (PS); and
- 4) Confidence Level (CL) of the recommended decision.

Hence, the following equation will calculate the Contributed Level of Importance (CLI) of each of the factors considered in both decisions (buy/not to buy the bid's documents and the overall bid/not to bid decision):

$$CLI_i = W_{Avg(i)} * S_i \quad \text{Equation (3)}$$

where:

$W_{Avg(i)}$  is the Average Weight of Importance for each factor calculated by equation (2) in section 5.7.3.1 for the determination of the importance indices of the seventy-seven factors affecting bid/no bid decisions, which also considers the importance indices of the industry.

$S_i$  is the model's user score of assessment on a particular factor, which is the contractor's satisfaction level for each particular factor regarding the project under investigation.

And then the Contributed Weight of Effect (CWE) of each factor considered in both decisions will be calculated by the following equation:

$$CWE_i = \frac{CLI_i}{W_{Avg(i)} * S_{Max(i)}} * \frac{100}{n} \quad \text{Equation (4)}$$

where:

$S_{Max(i)}$  is the maximum possible score of assessment on a particular factor by the model's user and is equal to 10 and  $n$  is the total number of factors considered in each decision.

Regarding the Project Score (PS) calculations, it should be noted that there are two decisions to be generated. The first PS is for the first decision, which is the buy/not to buy decision, while the second PS is for the second or overall decision, which is the bid/not to bid decision. Thus, there are two separate equations to calculate the project decisions. Although the equation is similar for each decision, they differ in relation to the number of factors considered for each decision. Hence, the following equations are applied for these calculations:

$$P.S._{Buy} = \sum_{i=1}^{n=48} CWE_i \quad \text{Equation (5)}$$

where the Buy decision is due to the situation if

$$P.S._{Buy} \geq 50 \rightarrow \text{Buy} \quad \text{and} \quad P.S._{Buy} \leq 50 \rightarrow \text{Do Not Buy}$$

$$P.S._{Bid} = \sum_{i=49}^{n=29} CWE_i \quad \text{Equation (6)}$$

$$P.S._{Bid} \geq 50 \rightarrow \text{Bid} \quad \text{and} \quad P.S._{Bid} \leq 50 \rightarrow \text{Do Not Bid.}$$

Finally, the Confidence Levels (CL) of the recommended decisions are calculated by the following equations:

$$CL_{Buy} = P.S._{Buy} \% \quad \text{Equation (7)}$$



$$CL_{Bid} = P.S.Bid \%$$

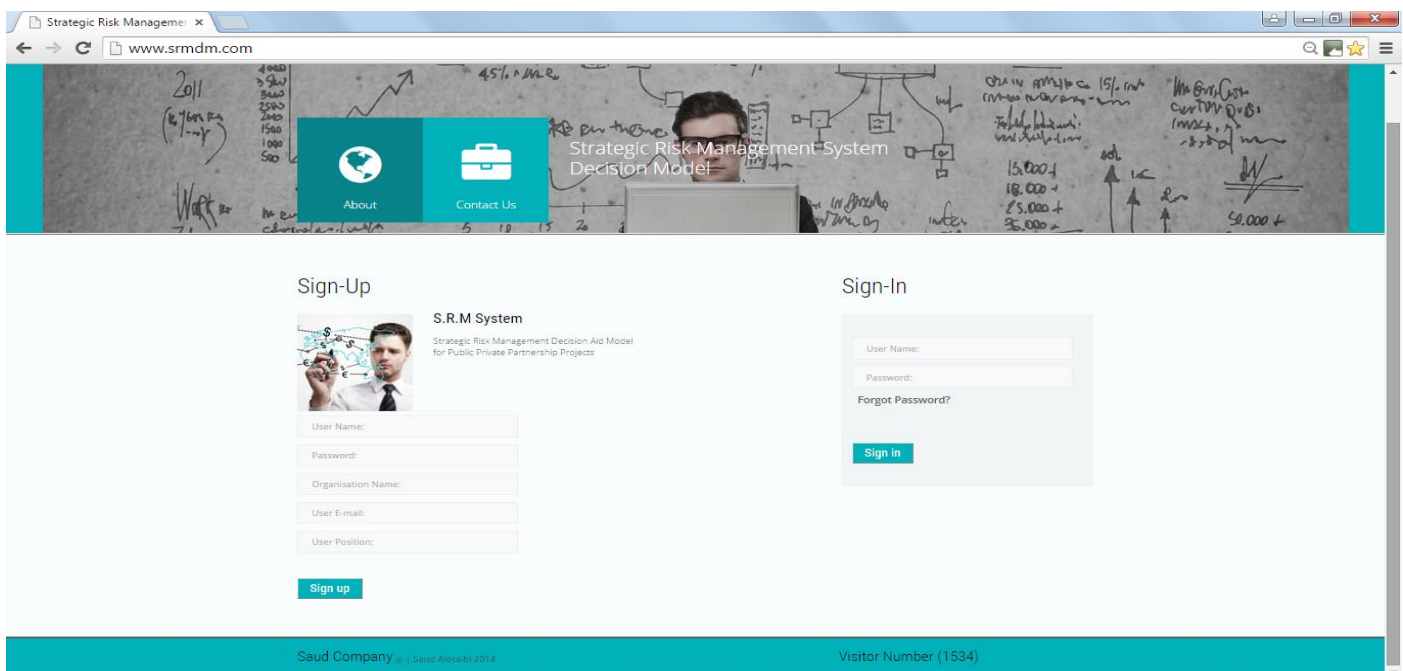
**Equation (8)**

### 7.3.4. The Web-Based Model Processes and Instructions

Based on the findings of the qualitative research strand, there are two main decisions to be considered: the first decision is to buy or not to buy the bid documents, while the second decision is to bid or not to bid for the proposed project. The findings also linked the buy/not to buy decision to the information gathered from the invitation letter and linked the bid/not to bid decision to the information gathered from the bid documents after making the buy decision. Thus, the web-based model's process is designed to facilitate these two main decisions. The model consists of five phases. The user is required to input the suitable choice in each phase which best describes his organisation's situation in parallel with the new project information. There are different critical factors to be considered and evaluated carefully for a better result, as will be explained in the following subsections.

#### 7.3.4.1 The Web-Based Model's Website

The model is available online at [www.srmdm.com](http://www.srmdm.com) for validation purposes. However, explanations about the model's website and contact details are available to users and open in new windows. Also, the sign up or sign in options for using the model are available, as displayed in the following figures.



**Figure 7.2: First Interface of the Web-Based Model**

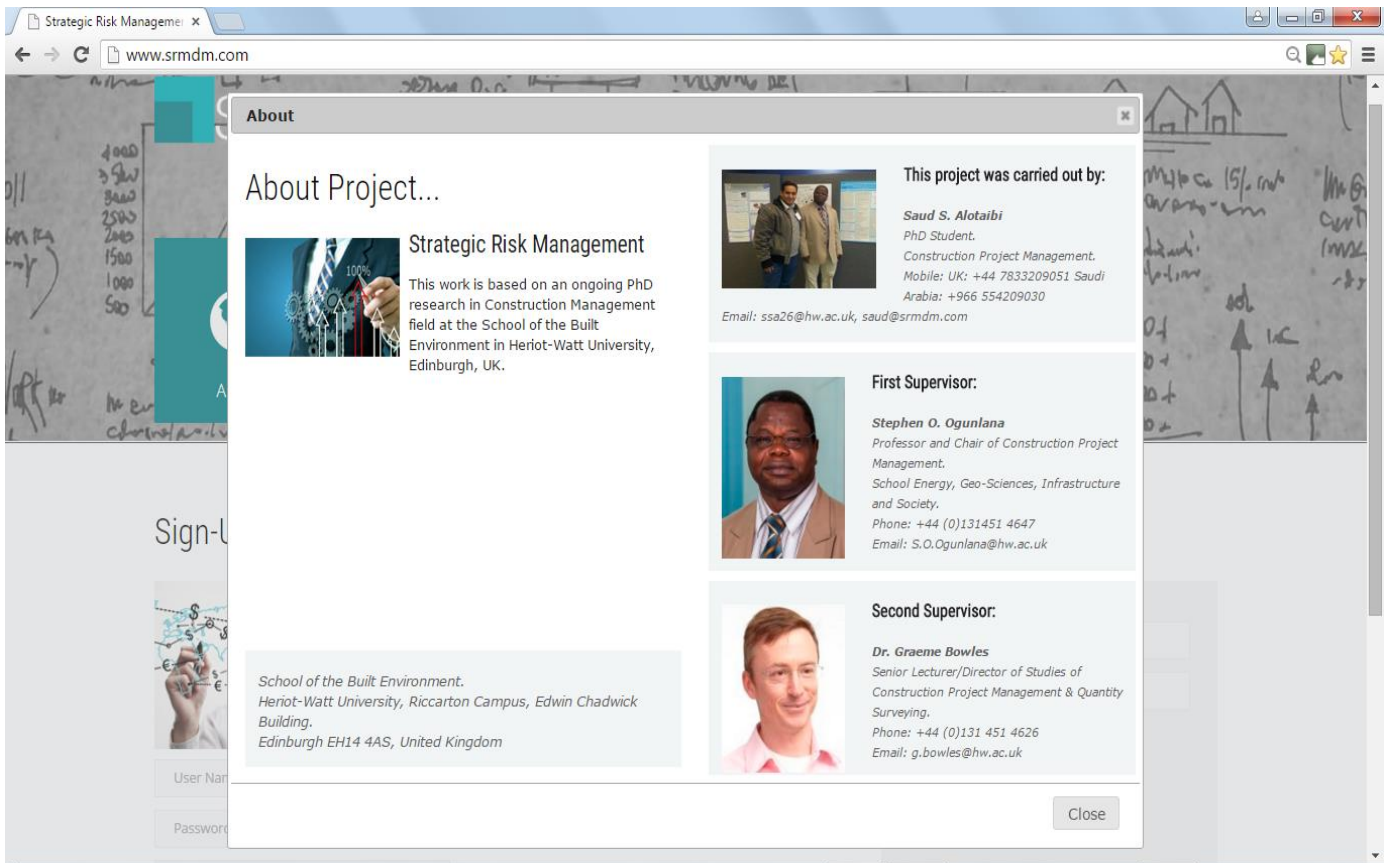


Figure 7.3: About the Web-Based Model

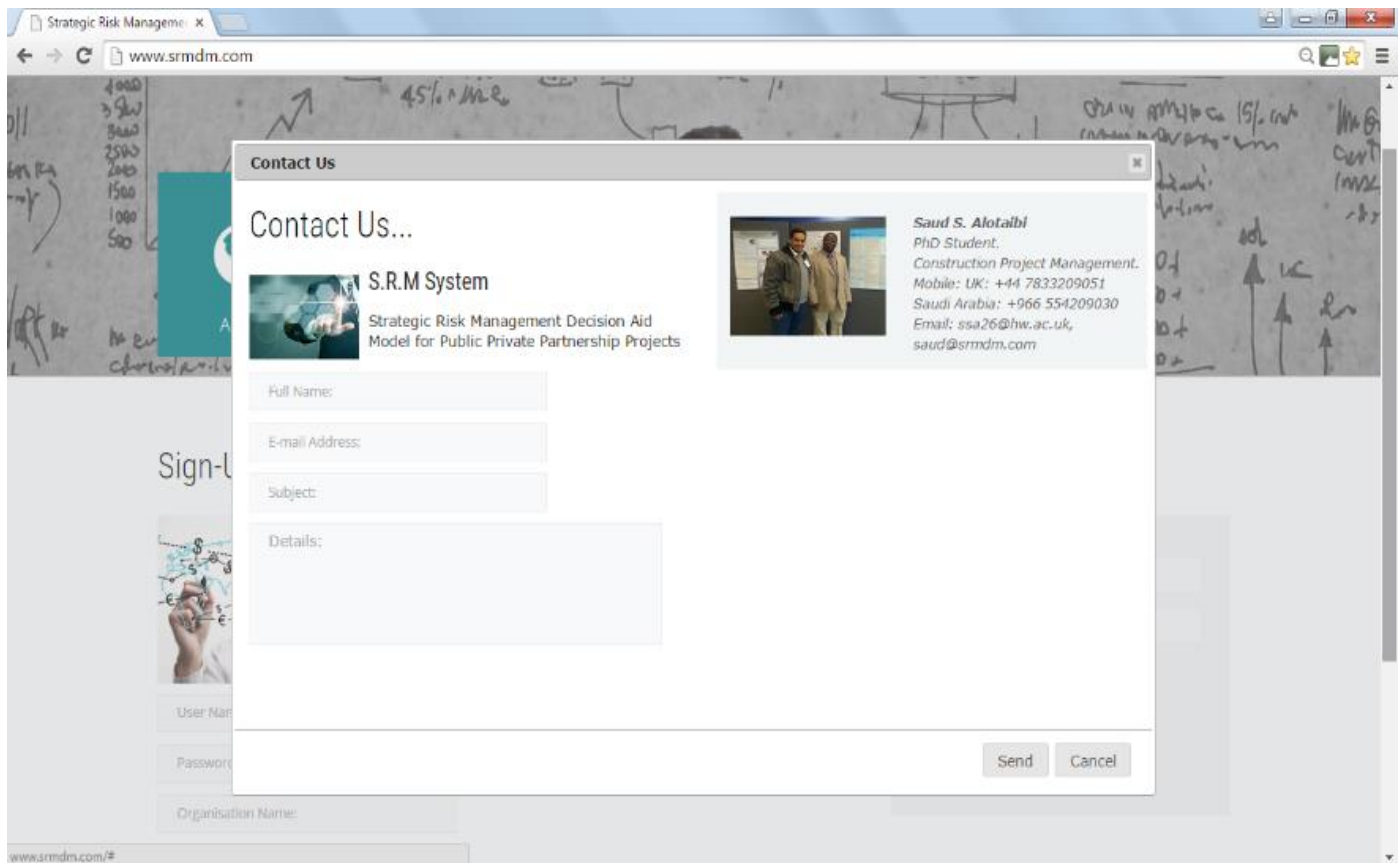


Figure 7.4: Contact Us Window

### 7.3.4.2 Log In to the Web-Based Model

The database of the model will provide a recording system for each user. The model will record the sign up details for each user, such as the organisation's name and the user position, for validation purposes, where the application user can use the model to assess many projects under his account, and where each project will be identified by the project's name given by the user when starting the model. After logging in to the model, the application user will find the following: an introduction to the project, the conceptual model, the instructions for the application, and the results record window. Additionally, the option to use the model for assessing a new project is available, as shown in the following figures.



## Strategic Risk Management System

A screenshot of the Strategic Risk Management System interface. At the top right, there is a blue button labeled 'Start New Model'. Below it, there is a navigation bar with four tabs: 'Introduction', 'Model Concept', 'Instruction', and 'Results'. The 'Introduction' tab is selected. The main content area contains several paragraphs of text. The first paragraph discusses the main objective of project management. The second paragraph discusses risk in general. The third paragraph discusses achieving strategic goals. The fourth paragraph discusses decision-making. The fifth paragraph discusses the PMBOK Guide. Below the text, there is a section titled 'Objectives of the model' with a list of five bullet points.

Start New Model

Introduction Model Concept Instruction Results

The main objective of project management is to maintain a good balance between the three conventional objectives of any construction project (cost, time and quality). Anything that may threaten the achievement of these objectives and prevent the organisation from meeting such targets is considered as a risk to the project. Wideman (1986) and Akintoye and Macleod (1997) define risk as the likelihood of unforeseen factors occurring, which would adversely affect the successful completion of the project in terms of cost, time, and quality.

Risk, which may be difficult to deal with, is inherent in every human endeavour. Also, risk is a permanent element in every decision making process, including design and planning decisions. As such, it is important to understand the nature of risk if an informed decision is to be made, particularly in the case of PPP projects that require different parties to work together towards a common goal, each with varying targets and objectives. It is essential to understand these risk factors if their possible gains and possible losses are to be evaluated and appropriate decisions on what to do about them are made.

Achieving an organisation's strategic goals and maintaining its strategy throughout critical decisions would make a significant contribution to the enhancement of the construction organisations' performance. The bid/no bid decision is the first strategic decision that a contractor makes on a project, and the careful understanding of the potential consequences of this decision for the organisation is a key factor in the success of the project and of the organisation. The bid/no bid decision is sometimes referred to as the project selection decision.

One of the most critical business decisions is whether or not an organisation should bid for a new project when an invitation has been received. Decision-making at the earliest stages of construction projects involves a process of gathering information from disparate noisy sources. This model aims to contribute to the enhancement of organisations' performance; through achieving the organisation strategic goals at the bid/no bid decision.

According to the PMBOK Guide, It is important that a Risk Management Strategy be established early in a project and that risk be continually addressed throughout the project life cycle. Risk Management Processes includes several related actions, including: risk planning, risk identification, risk analysis, risk response (handling), and risk monitoring and control. Using this is model is the first step in adopting these processes and helps the decision makers to address the second and third processes as well.

### Objectives of the model

- To translate the organisation strategy in terms of project selection for competitive bidding into policies or rules of accepting the proposed bid,
- To identify and evaluate the PPP success factors which affect the project success from the perspective of Risk Management,
- To identify and evaluate the international investment success factors which affect project success from the perspective of Risk Management,
- To model the decision of buy/no buy the bid documents and bid/no bid in the light of achieving the organisation strategy and goals,
- To maintain the organisation strategy throughout the bid/no bid decision processes, and
- To produce a decision on a rational basis.

Figure 7.5: The Web-Based Model Interface after Logging In



# Strategic Risk Management System

Start New Model

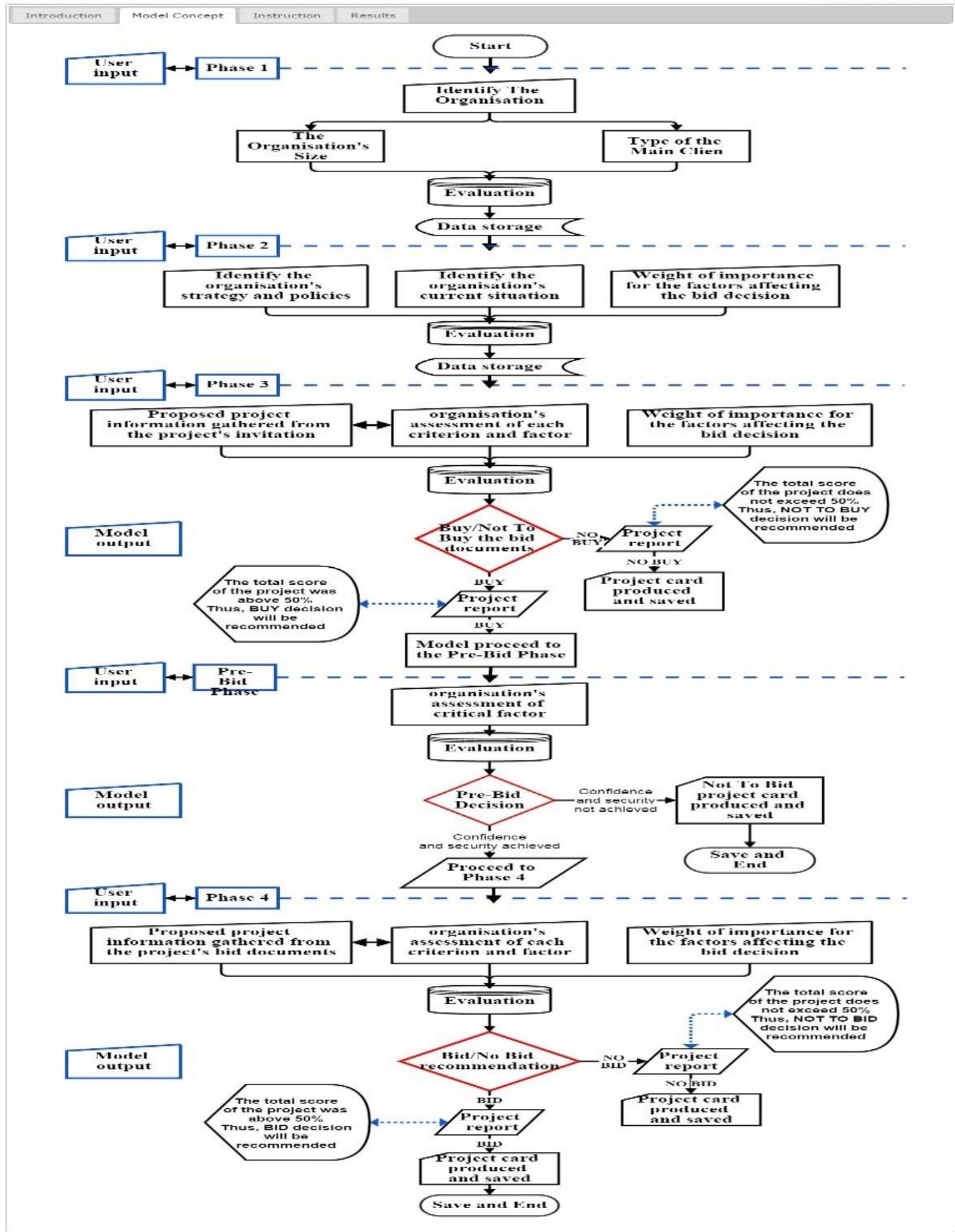


Figure 7.6: The Concept of the Model's Window in the Web-Based Model



# Strategic Risk Management System

Start New Model

Introduction   Model Concept   Instruction   Results

The model consists of five phases. The user is required to input the suitable choice in each phase, which best describes his organisation's situation in parallel with the new project information. There are different critical factors to be considered and evaluated carefully for a better result. The phases are as follows:

### 1) Phase One: Identify The Organisation

Multiple choice questions for the organisation's size and the main type of client will be evaluated. As a dynamic model, based on the user selection of this phase, the model will decide the class of the weight of importance for the strategic factors in the following phases. This class will be saved and given to the organisation's situation, and will be applied to the mathematical equations that affect the model's decisions.

### 2) Phase Two: Organisation Policies and Strategy in terms of Bid/No Bid Decision

A set of strategic factors related to the organisation's characteristics/situation should be considered and evaluated based on the weight of importance they represent for the bid/no bid decision in terms of their adoption as a criteria of the organisation's strategy and policies. The answers method of this phase will be in a form of score of importance scale from 0 to 10 for each factor; where 0 is the lowest score of importance and 10 is the highest score of importance.

### 3) Phase Three: Proposed Project Information Gathered from the Project Invitation

Another set of strategic factors to be considered and evaluated for the proposed project based on information gathered from the project's invitation. In this phase; Project's Characteristics, Client Characteristics, and Bidding Situation in addition to PPP and international investment critical success factors will be evaluated bearing in mind the organisation's strategy and policies. The answers method of this phase is similar to the method used in phase two. After filling the above phases, the model will generate a decision card related to the subject of buying the bid documents with a percentage score of acceptance/satisfaction for the proposed project. The percentage score should be  $\geq 50\%$  in order to proceed with a positive confidence level to phase four. Also, after generating the decisions report, graphical information will be revealed to illustrate the strength and weakness in the above phases.

### 4) Critical Phase: The Pre-Bid Phase:

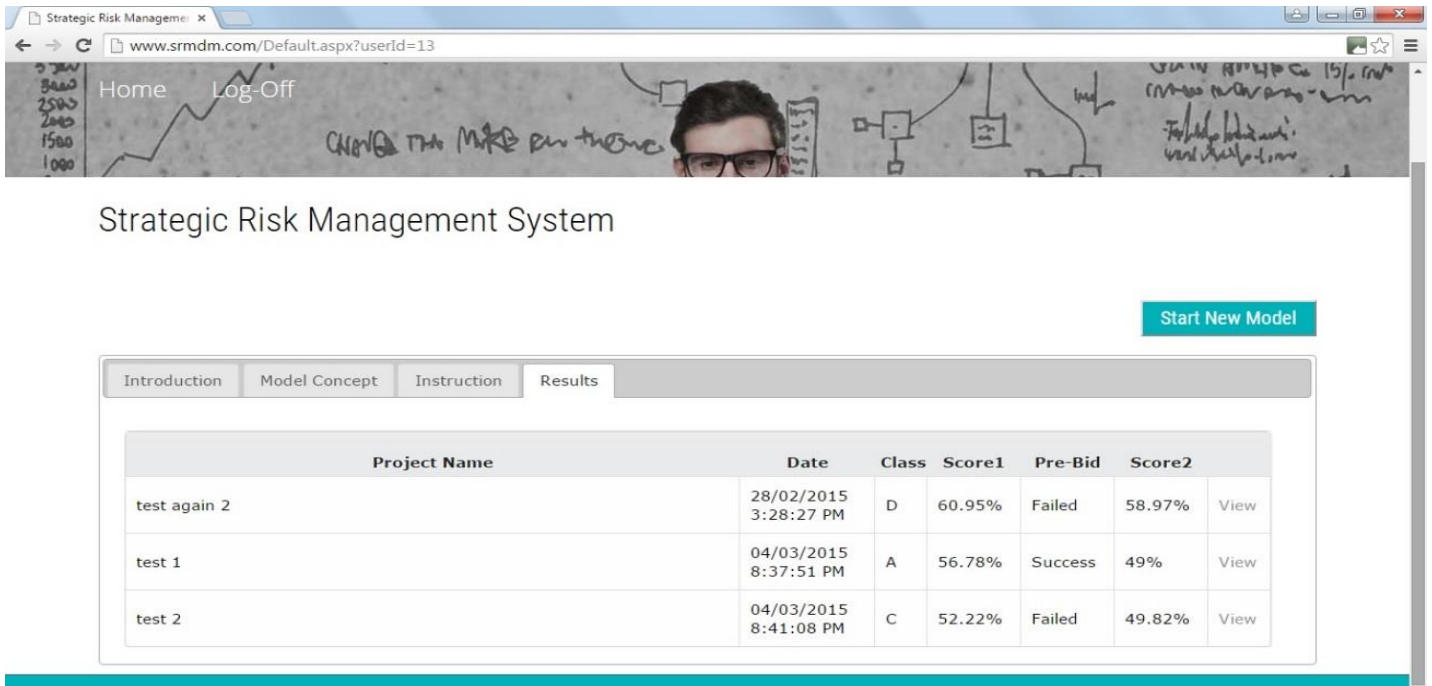
This phase contains critical factors linked directly to the bidding decision, where the failure in achieving one or more of this critical factors will directly and negatively affect the Bid decision. Nevertheless, in the failure case, the user can proceed to the next phase to assess his project and find out the confidence level rate associated with his scores. It should be noted that achieving all of these critical factors will guide the model to use the next phase assessment and scores results to generate the bidding decision and the confidence level rate.

### 5) Phase Four: Proposed Project Information Gathered from the Project Bid Documents

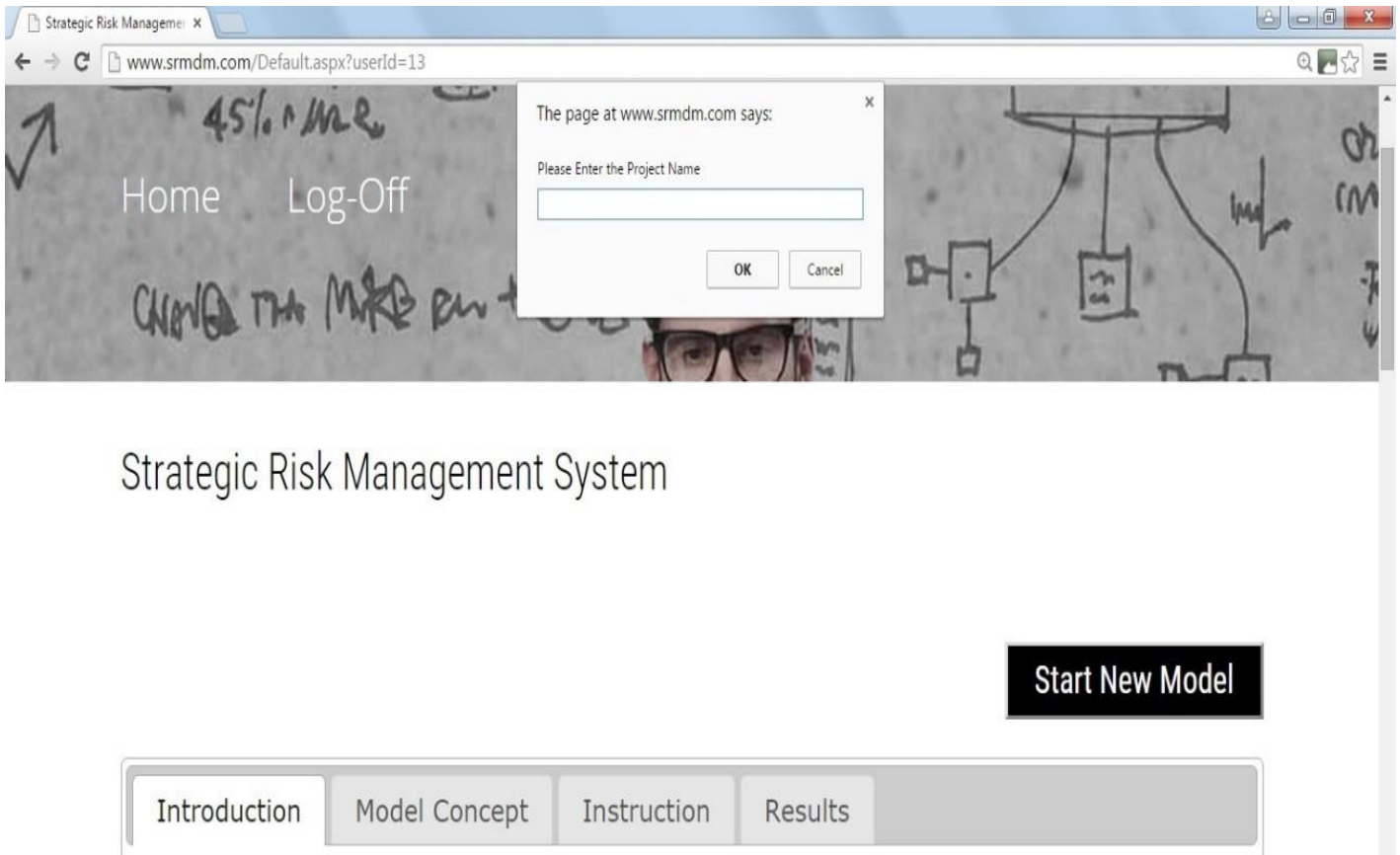
In this phase, the user is required to consider and evaluate Tender's Criteria factors based on information gathered from the bid documents bearing in mind the organisation's strategy, policies, and current situation. The answers method of this phase is similar to the method used in phase two and three. After this phase, the model will generate a decision card in the subject of bid/no bid for the proposed project with a percentage score of acceptance/satisfaction level. A graphical information for phase five will be revealed, and saving record for future adjustments and/or reviews will be available.

Precisely, there are two decision cards will result from the model. First decision card is related to the buy/not to buy the bid documents decision. This decision will be generated based on inputs made by the user to evaluate the related strategic factors in each phase of the first three phases of the model. The second decision card is related to the main decision, which is to bid/not to bid decision for the proposed project. This decision will be generated based on inputs made by the user to evaluate the related critical factors in the pre-bid phase plus the results of phase five. A confidence level rate will be provided with each decision card to show the percentage score of the success rate.

Figure 7.7: Instructions of the Model's Window in the Web-Based Model



**Figure 7.8: Example of Recorded Results Window in the Web-Based Model**



**Figure 7.9: Enter the Project Name message when starting the Web-Based Model**



### 7.3.4.3 Inputs of Phase One

After assigning a name for the proposed project, the user will be transferred to the first phase of the web-based model in order to identify his/her organisation, where multiple choice questions regarding the organisation's size and the main type of client will be evaluated. As a dynamic model, based on the user selection of this phase, the model will decide the appropriate class of the weight of importance for the strategic factors in the following phases. This class will be saved and given to the organisation's situation, and then, will be applied to the mathematical equations that affect the model's decisions.

Strategic Risk Management x  
www.srmdm.com/PhaseOne.aspx?userId=13&orgId=49

Home Log-Off

# Phase One

## Identify the Organisation

Project Name:

Is your annual business volume?

over 50 million SR.

less than 50 million SR.

Do you work mainly with?

Private Sector.

Public Sector.

Both Sectors.

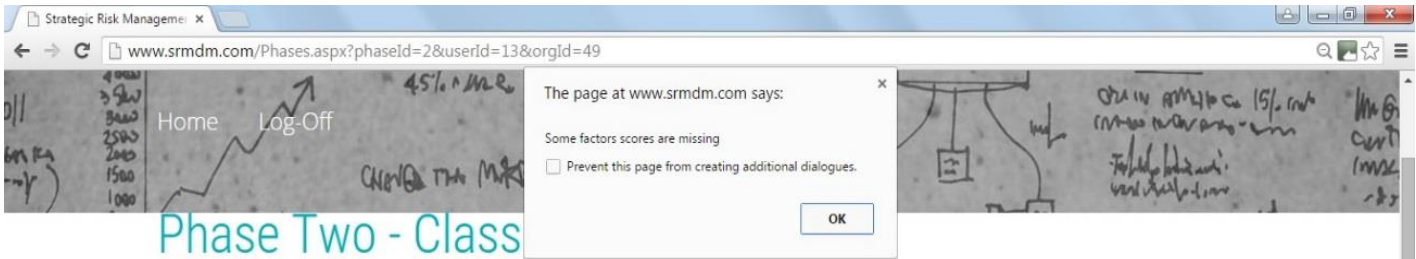
**Figure 7.10: Phase One of the Web-Based Model**

### 7.3.4.4 Inputs of Phase Two

A set of strategic factors related to the organisation's current situation should be considered and evaluated based on the weight of importance they represent for the bid/no bid decision, in terms of their adoption as criteria to link the organisation's strategy and policies with its bidding decision. The answers method of this phase will be in the form of a score of importance scale from 0 to 10 for each factor; where 0 is the lowest score of importance and 10 is the highest score of importance. The factors considered in this phase are shown in Table 7.1, while Figure 7.11 expresses phase two in the web-based model. On the same screen, a warning message will also be shown to the user when there are any missing data.

**Table 7.1: Phase Two Factors**

Code	Category	Factor Description
F1	<b>The Contractor's Current Situation</b>	Considering the need for a new project
F2		Considering the organisation's current workload
F3		Considering the organisation's current projects' performance
F4		Considering the condition of labour availability
F5		Considering the organisation's financial situation



Organisation policies and strategy in terms of bid/no bid decision

#	Factor Considered	Score From 0 To 10 Low to High	Risks Indicator
<b>The Contractor's Current Situation</b>			
1	Considering the need for a new project	8	✓
2	Considering the organisation's current workload	4	⚠
3	Considering the organisation's current projects' performance	5	✓
4	Considering the condition of labour availability	7	✓
5	Considering the organisation's financial situation		

Cancel Back Save & Exit Next

**Figure 7.11: Phase Two of the Web-Based Model**

**7.3.4.5 Inputs of Phase Three**

Another set of strategic factors to be considered and evaluated for the proposed project is based on information gathered from the project invitation. In this phase, Project Characteristics, Client Characteristics, and Bidding Situation as well as PPP and international investment critical success factors will be evaluated, bearing in mind the organisation's strategy and policies. The method of recording answers in this phase, which is similar to the method used in phase two, will be in the form of score of importance scale from 0 to 10 for each factor; where 0 is the lowest score of importance and 10 is the highest score of importance. The factors considered in this phase are shown in Table 7.2, while Figure 7.12 expresses phase three in the web-based model.



Subsequently, after assigning the score of importance for each factor in phases two and three, the model will generate a decision card related to the subject of buying the bid documents, with a percentage score of acceptance/satisfaction for the proposed project. The percentage score should be  $\geq 50\%$  in order to proceed with a positive confidence level to phase four. In addition, after generating the decisions report, graphical information will be revealed to illustrate the strength and weakness in the above phases.

**Table 7.2: Phase Three Factors**

F6	<b>Project Characteristics</b>	Considering the level of acceptance of the project's size in Saudi Riyals
F7		Considering the location of the project
F8		Compatibility of the organisation's type of work with the type/nature of the project
F9		Considering the level of acceptance of the project's duration
F10		Considering the past experience with similar projects
F11		Considering the benefits expected in terms of the renewal stage of the classification certificate after conducting the project
F12	<b>Client Characteristics</b>	Considering the client's financial capacity
F13		Considering the ability of the client to provide a financial guarantee
F14		Considering the client's reputation
F15		Considering the previous experience with the client if existing
F16		Consideration of other potential projects available from the same client
F17		Considering the ease of obtaining project payments from the client
F18	<b>Bidding Situation</b>	Level of acceptance of the bid document price
F19		Sufficiency of time remaining to submit the bid
F20		Considering the expected competitors before entering the bid
F21		Considering the classification degree required to enter the bid
F22		Considering the scope of work required to enter the bid
F23		Availability of the required performance security (bond & guarantee)
F24		The expected chance of winning the bid
F25		Considering the early implementation of partnering relationship
F26	<b>PPP Success Factors</b>	Considering the adoption of an effective procurement route to conduct the project
F27		Unifying a specific vision with partners
F28		Level of commitment of partners
F29		Consideration of applying open communication and trust between partners
F30		Willingness of partners to compromise and collaborate
F31		Level of respect between partners
F32		Taking into consideration the community outreach
F33		Considering the accessibility of political support and facilitation in the targeted country
F34		Considering the adoption of local and global expert advice and review for the proposed project in the targeted country
F35		Considering risk awareness in general for the proposed project and the targeted relationship
F36		Taking into consideration the condition of clear rules and determined responsibilities between partners

F37		Considering the application of monitoring the partnering processes
F38		Taking into consideration local and/or global subcontractors' involvement for conducting the proposed project
F39		Considering the innovation capability in the targeted relationship
F40		Considering the availability of a conflict resolution strategy for the targeted relationship
F41	<b>International Investment Success Factors</b>	Considering the economic stability of the targeted country of project
F42		Consideration of predictable political risks of the country, such as visa restrictions and customs constraints
F43		Consideration of the financial risks of the country (including exchange rate fluctuations, inflation, interest rate fluctuations and taxes)
F44		Considering the prevailing climatic/geographical conditions of the target country of operation
F45		Considering the use of local management and staff, the formation of joint ventures and/or consortia, or the use of local agents, local sponsors or facilitators in the target country
F46		Understanding the cultural variables allied with all project stakeholders and the adaptation of new management skills and techniques in order to accommodate them
F47		Understanding the different legal systems that are in operation in the target country; for Saudi Arabia, as an Islamic country, and customary law practices
F48		Evaluation of the client's negative characteristics in the target country, such as late payment, corruption, delays in approvals and permits, and government bureaucracy and poor infrastructure

# Phase Three - Class A

Proposed projects information gathered from the projects invitation

#	Factor Considered	Score From 0 To 10 Low to High	Risks Indicator
<b>Project's Characteristics</b>			
1	Considering the level of acceptance of the project's size in Saudi Riyal	4	⚠️
2	Considering the location of the project	5	✅
3	Compatibility of the organisation's type of work with the type/nature of the project	5	✅
4	Considering the level of acceptance of the project's duration	5	✅
5	Considering the past experience with similar projects	5	✅
6	Considering the benefits expected in terms of renewal stage of classification certificate after conducting the project	5	✅
<b>Client Characteristics</b>			
7	Considering the client's financial capacity	5	✅
8	Considering the ability of client to provide a financial guarantee	5	✅
9	Considering the client's reputation	9	✅
10	Considering the previous experience with the client if existed	7	✅
11	Consideration of other potential projects available from the same client	5	✅
12	Considering the easiness of obtaining project payments from the client	5	✅
<b>Bidding Situation</b>			
13	Level of acceptance of the bid document price	7	✅
14	Sufficiency of time remaining to submit the bid	5	✅
15	Considering the expected competitors before entering the bid	5	✅
16	Considering the classification degree required to enter the bid	7	✅
17	Considering the scope of work required to enter the bid	9	✅
18	Availability of the required performance security (bond & guarantee)	5	✅
19	The expected chance of winning the bid	7	✅
<b>PPP Success Factors</b>			
20	Considering the early partnering implementation	4	⚠️
21	Considering the adoption of an effective procurement route to conduct the project	5	✅
22	Unifying specific vision with partners	4	⚠️
23	Level of commitment of partners	5	✅
24	Consideration of applying open communication and trust between partners	5	✅
25	Willingness of partners to compromise and collaborate	5	✅
26	Level of respect between partners	5	✅
27	Taking into consideration the community outreach	7	✅
28	Considering the accessibility of political support and facilitation in the targeted country	9	✅
29	Considering the adoption of local and global expert advice and review for the proposed project in the targeted country	7	✅
30	Considering risk awareness in general for the proposed project and the targeted relationship	5	✅
31	Taking into consideration the condition of clear rules and determined responsibilities between partners	3	⚠️
32	Considering the application of monitoring the partnering processes	5	✅
33	Taking into consideration local and/or global subcontractors involvement for conducting the proposed project	4	⚠️
34	Considering the innovation capability in the targeted relationship	5	✅
35	Considering the availability of a conflict resolution strategy for the targeted relationship	5	✅
<b>International Investment Success Factors</b>			
36	Considering the economic stability of the targeted country of project	9	✅
37	Consideration of predictable political risks of the country such as visa restrictions and customs constraints	5	✅
38	Consideration of the financial risks of the country (including exchange rate fluctuations, inflation, interest rate fluctuations and taxes)	5	✅
39	Considering the prevailing climatic/geographical conditions of the target country of operation	4	⚠️
40	Considering the use of local management and staff, the formation of joint ventures and/or consortia, or the use of local agents, local sponsors or facilitators in the target country	3	⚠️
41	Understanding the cultural variables allied with all project stakeholders; and the adaptation of new management skills and techniques in order to accommodate them	9	✅
42	Understanding the different legal systems that are in operation in the target country; for Saudi Arabia it is Islamic and customary law practices	4	⚠️
43	Evaluation of The client's negative characteristics in the target country such as late payment, corruption, delays in approvals and permits, and government bureaucracy and poor infrastructure	7	✅

Figure 7.12: Phase Three of the Web-Based Model

### 7.3.4.6 Model's First Report

The outputs of the developed model and application are designed to be informative and easy to read and interpret and the model is designed to indicate to the risk factors and explain their possible effects. Generally, the model provides two main reports. The first one reports on the evaluation of the information gathered from the invitation letter, resulting in the first decision point of whether to buy the bid documents (forty-eight factors are considered in this stage). The second report is on the evaluation of the information gathered from the bid documents, and contains the evaluation of twenty-nine factors, resulting in the recommended bid/no bid decision. It should be further noted that there is a pre-bid stage output, which is linked to the bid/not to bid report. Thus, there are two main decision reports, and three output stages. Moreover, there are risk indicators for each factor in all the phases, in addition to possible negative-effect explanations for each risk factor on the proposed project. This section will present the first output, while the second and third outputs will be discussed in the following sections.

The first output of the model is related to the first report about the decision to buy/not to buy the bid documents. Therefore, the model will evaluate the inputs of the previous phases, and then will generate the decision. In particular, the model will first identify the class of the application user's organisation and consider the appropriate importance indices identified from the industry. Second, the model will apply the mathematical equations in order to evaluate the factors of phases two and three, and hence, to generate the appropriate buying decision. Graphical information of the user assessment of the factors will also be introduced with the decision recommendation, as can be seen in the Figures 7.13 and 7.14.

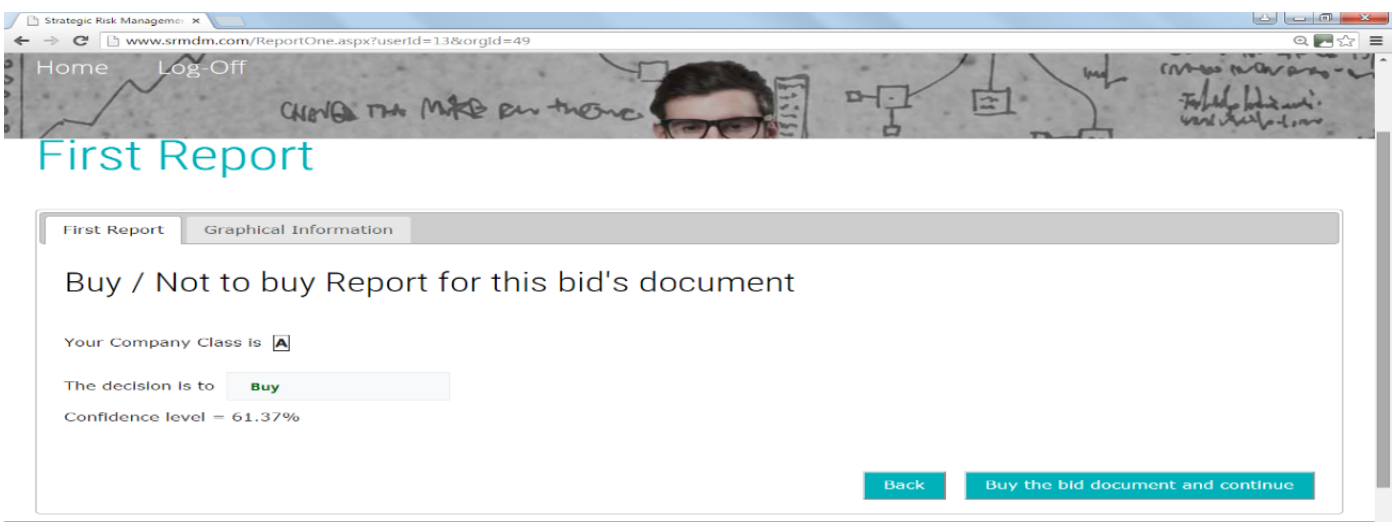
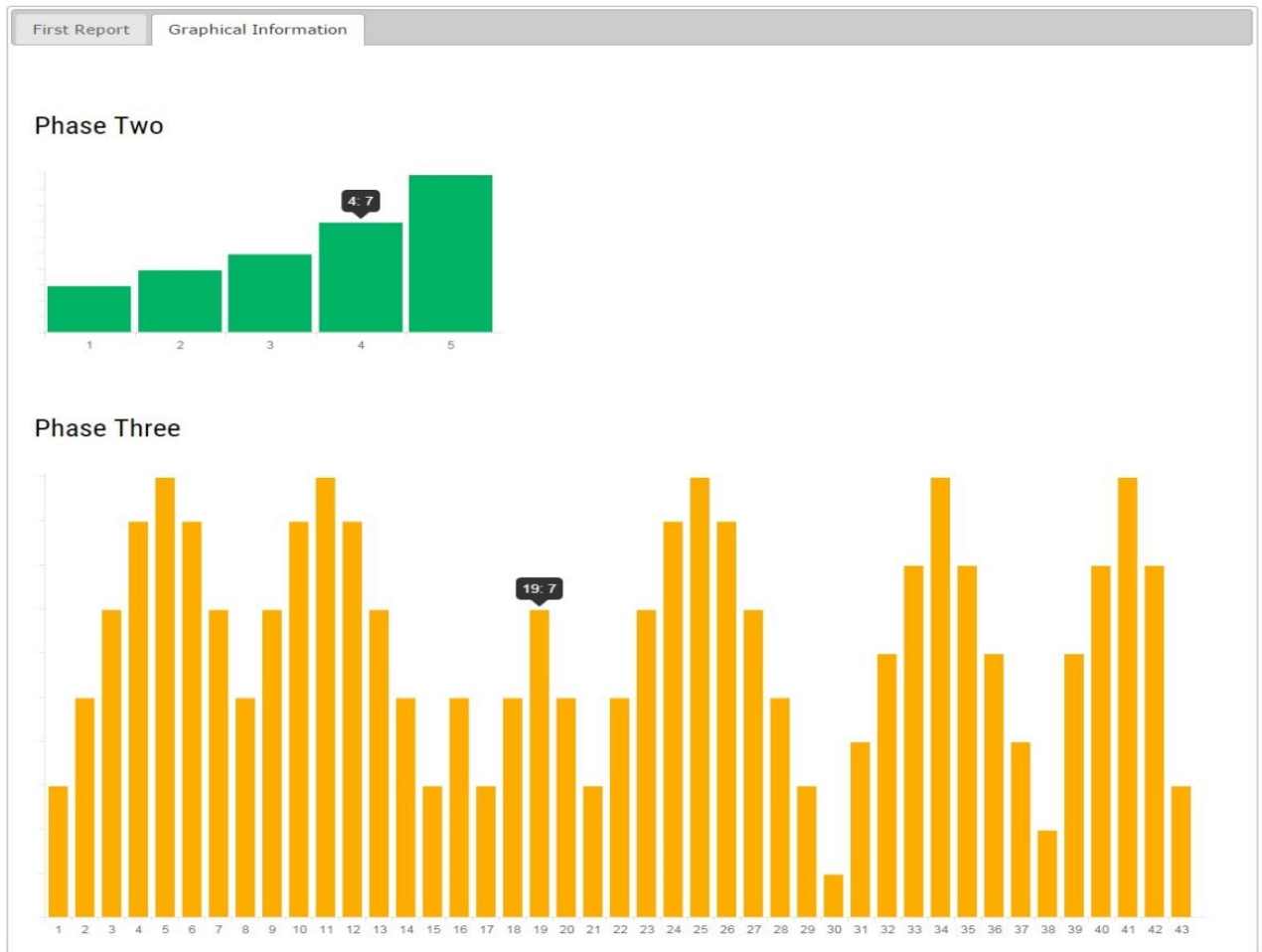


Figure 7.13: An Example of the Model's First Report



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**Figure 7.14: An Example of the Graphical Information of the Model's First Report**

### 7.3.4.7 Model's Critical Phase Inputs and Outputs

This phase contains critical mandatory factors linked directly to the bidding decision, where the failure in achieving one or more of this critical factors will directly and negatively affect the bid decision. Nevertheless, although the model's recommendation for the bid decision in the next phase will be not to bid in case of the failure in meeting these mandatory factors, the user can proceed to the next phase to assess his project and find out the confidence level rate associated with his scores. It should be noted that failure in achieving all of these critical mandatory factors will guide the model to generate a warning message to notify the user about the importance of these factor and their effect

on the overall bid decision, and also, will generate another message in the final report to explain why not to bid, even if the user has a positive confidence level rating.

The factors adopted in this critical pre-bid phase are the five highest-ranked factors evaluated from the quantitative research strand, in particular, from Table 5.17 of the ranked order of factors affecting the bid/no bid decision and presented in this phase as a multiple choice questions' method for evaluation and assessment. The factors of this phase, and its input, and output are shown in Table 7.3, Figure 7.15 and figure 7.16, respectively.

**Table 7.3: Pre-Bid Phase Critical Factors**

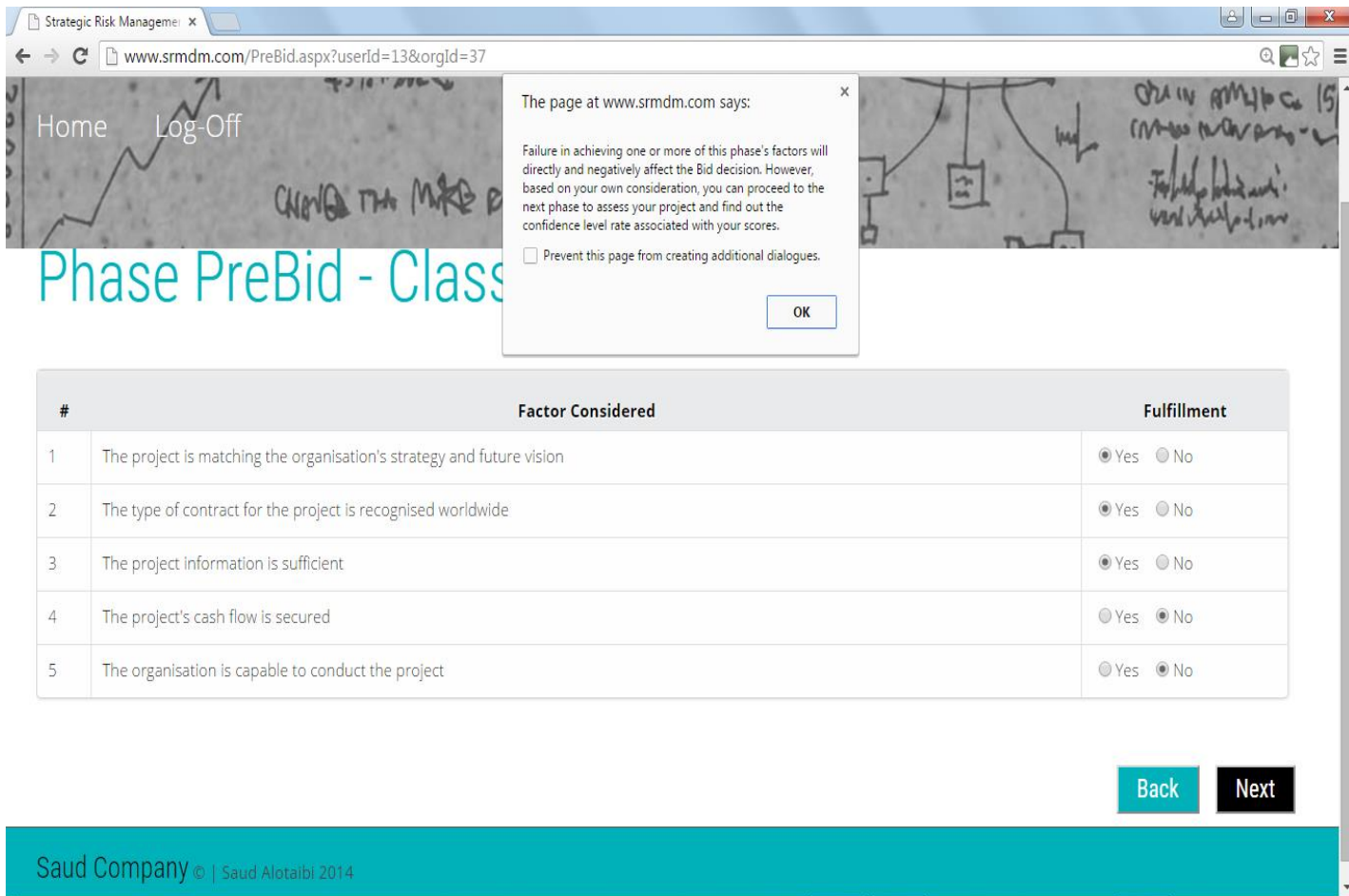
Order	Code	Factor Description	Ib
1	F64	The project information is sufficient	93.92
2	F76	The organisation is capable of conducting the project	93.17
3	F71	The project's cash flow is secured	92.67
4	F77	The project matches the organisation's strategy and future vision	91.92
5	F49	The type of contract for the project is recognised worldwide	91.00

#	Factor Considered	Fulfillment
1	The project is matching the organisation's strategy and future vision	<input checked="" type="radio"/> Yes <input type="radio"/> No
2	The type of contract for the project is recognised worldwide	<input checked="" type="radio"/> Yes <input type="radio"/> No
3	The project information is sufficient	<input checked="" type="radio"/> Yes <input type="radio"/> No
4	The project's cash flow is secured	<input checked="" type="radio"/> Yes <input type="radio"/> No
5	The organisation is capable to conduct the project	<input type="radio"/> Yes <input checked="" type="radio"/> No

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**Figure 7.15: Pre-Bid Phase of the Web-Based Model**





**Figure 7.16: Pre-Bid Phase Warning Message**

#### ***7.3.4.8 Inputs of Phase Four***

In this phase, the user is required to consider and evaluate Tender Criteria factors based on information gathered from the bid documents, after deciding to buy the bid documents, bearing in mind the organisation's strategy, policies, and current situation. The response method of this phase is similar to the method used in phases two and three, where a set of factors needs to be considered and scored. This phase contains twenty-four factors, which can be seen in Table 7.4 and Figure 7.17 of the web-based model, as the final phase of the model, where the final report of the overall decision will follow after this phase.

**Table 7.4: Phase Four Factors**

Code		Factors to be considered
F50	<b>Tender Criteria</b>	Level of acceptance of the contract conditions
F51		The accuracy of bill of quantity provided by the client
F52		The accuracy of the original cost estimated by the client
F53		Clarity of the work and specifications needed for the project
F54		Clarity of quality scope required for the project
F55		Level of completeness of project's design
F56		The accuracy of the cost estimated by the contractor
F57		Degree of possible alternative design to reduce the project cost if allowed
F58		Considering the possibility of additional work needed for fulfilling the project
F59		Considering the use of nominated subcontractors requested by the client
F60		Considering safety hazards
F61		Level of availability of resources and manpower
F62		Supply chain management consideration
F63		Level of familiarity with site condition
F65		Reputation of the management consultant appointed by the client
F66		Considering the project management system required to conduct the project
F67		Considering the project supervision procedure for the targeted relationship
F68		Considering the Governmental division requirements
F69		Considering the adequacy of advance payment provided by client if existing
F70		The availability of work-capital required to start the project
F72		Considering general office overheads
F73		Considering the ease of obtaining a bank loan if needed
F74		Degree of satisfaction with the expected profit
F75		The benefits expected in terms of general relationship





## Phase Four - Class D

Proposed project's information gathered from the project's bid documents

#	Factor Considered	Score From 0 To 10 Low to High	Risks Indicator
<b>Tender's Criteria</b>			
1	Level of acceptance of the contract conditions	3	⚠️
2	The accuracy of bill of quantity provided by the client	5	✅
3	The accuracy of the original cost estimated by the client	7	✅
4	Clarity of the work and specifications needed for the project	9	✅
5	Clarity of quality scope required for the project	7	✅
6	Level of completeness of project's design	5	✅
7	The accuracy of the cost estimated by the contractor	3	⚠️
8	Degree of possible alternative design to reduce the project cost if allowed	1	⚠️
9	Considering the possibility of additional work needed for fulfilling the project	3	⚠️
10	Considering the use of nominated subcontractors requested by the client	5	✅
11	Considering safety hazards	7	✅
12	Level of availability of resources and manpower	9	✅
13	Supply chain management consideration	10	✅
14	Level of familiarity with site condition	9	✅
15	Reputation of the management consultant appointed by the client	7	✅
16	Considering the project management system required to conduct the project	6	✅
17	Considering the project supervision procedure for the targeted relationship	5	✅
18	Considering the Governmental division requirements	3	⚠️
19	Considering the adequacy of advance payment provided by client if existed	5	✅
20	The availability of work-capital required to start the project	4	⚠️
21	Considering general office overhead	6	✅
22	Considering the easiness of obtaining a bank loan if needed	8	✅
23	Degree of satisfaction on the expected profit	9	✅
24	The benefits expected in terms of general relationship	10	✅

Cancel

Back

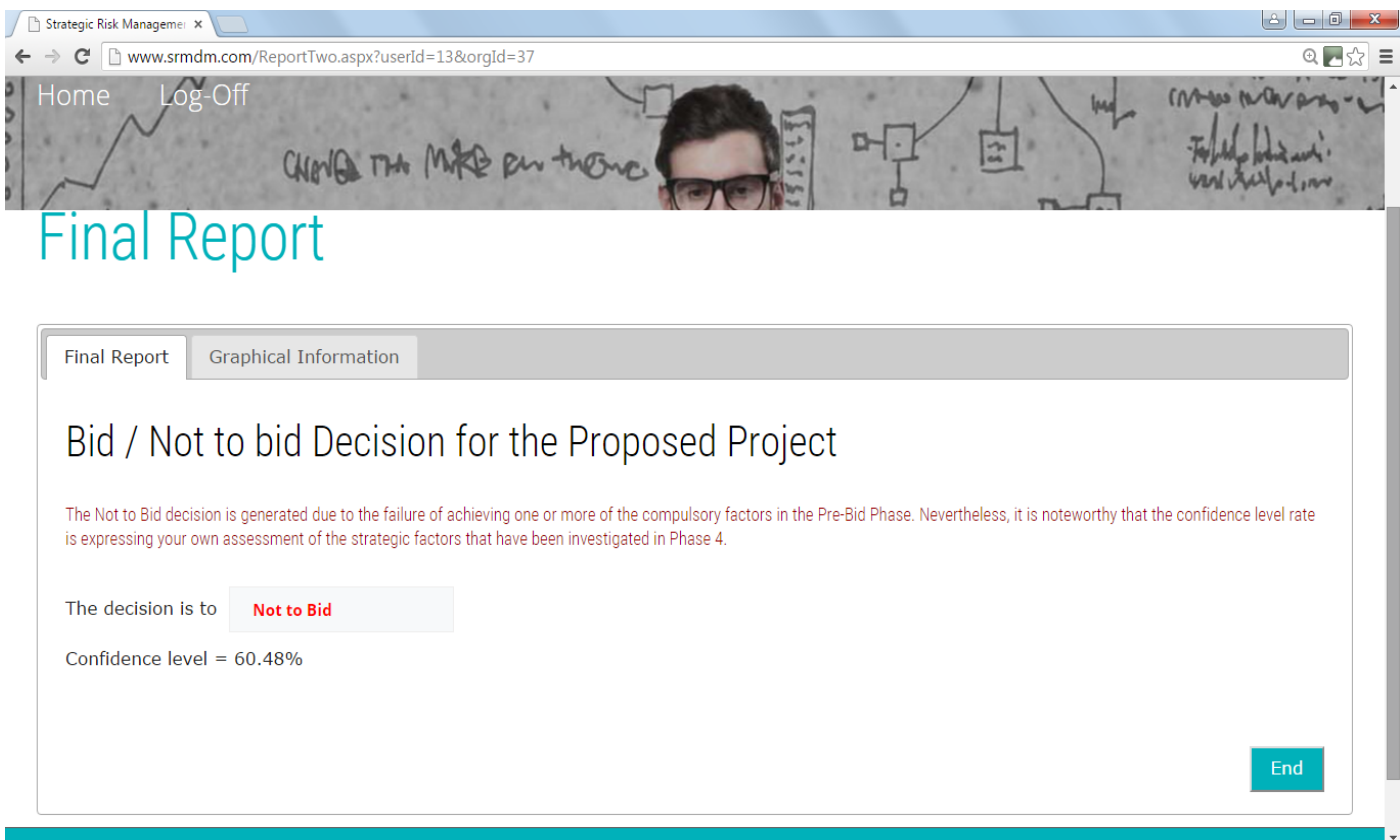
View Results

**Figure 7.17: Phase Four of the Web-Based Model**

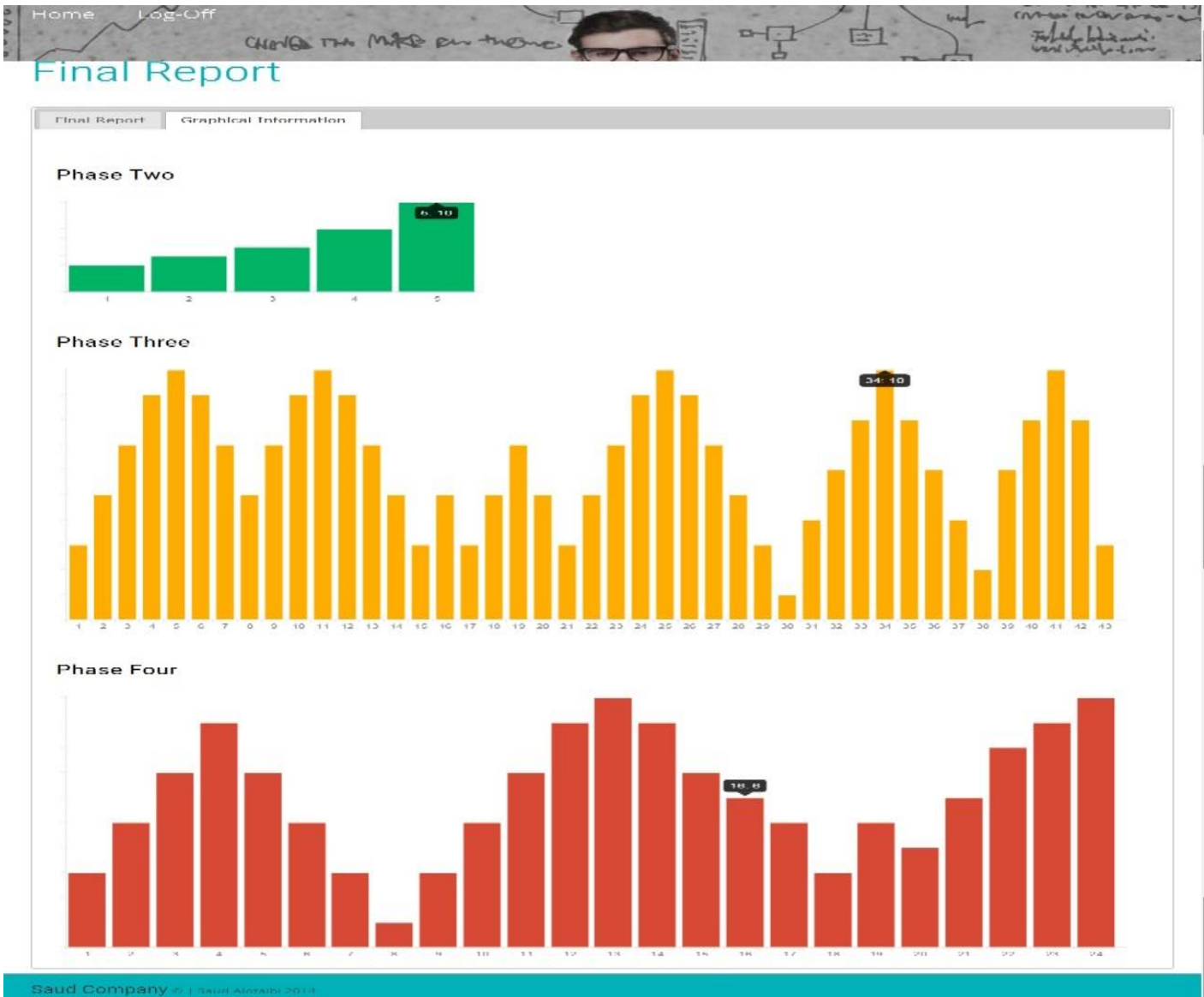
### 7.3.4.9 Model's Final Report

After assessing phase four, the model will generate a decision card on the subject of the bid/no bid for the proposed project with a percentage score of the recommendation's confidence level. A graphical information for the final phase will be shown. It will also be possible for the user to save the record for future adjustments and/or reviews when signing in to his/her application account. In detail, this final report is the result of the evaluation of the information gathered from the bid documents which contains the assessment of twenty-nine factors.

Further, it should be noted that the pre-bid phase output is linked to the bid/not to bid report, as can be found in Figure 7.18. Thus, when a warning message appears in the critical phase, a decision of not to bid will be issued. However, if the user scored positive results for the pre-bid phase (five factors), the model will apply the mathematical equation in order to evaluate the twenty-four factors included in phase four to generate the best possible recommendation for the bidding decision. Graphical information regarding the user's scores of all the phases' factors will be introduced with the bidding decision recommendation, as shown in Figure 7.19.



**Figure 7.18: An Example of the Final Report Linked to the Pre-Bid Phase**



**Figure 7.19: An Example of the Final Report Graphical Information**

#### **7.4. Validation and Evaluation of the Web-Based Model**

This study seeks to develop a strategic risk management decision model suitable for investors in the PPP market, especially for international investors in the Saudi Arabian construction industry, passed on the view that when inherent risks are adequately considered in the pre-decision stage, successful bidding decisions and overall project success can be successfully achieved. The development of the model is in the form of a web-based application that aspires to facilitate bid/no bid decision and to improve practice in the performance of risk management at the strategic level of an international PPP project.

Thus, the model validation and evaluation are essential parts of a framework development process by which the model is to be accepted and used to support decision makers in the real practical field of the industry (Macal, 2005; Bageis, 2008; Awodele, 2011). In addition, Macal (2005) warns that one of the very first questions a person promoting a model is likely to encounter is whether the model has been validated. In order to answer this and some other pertinent questions, including: ‘Has the model been validated?’ and ‘To what extent does the model represent the problem entity?’ This section therefore describes the procedures followed in validating the model and also presents the results of the model evaluation.

Yahaya (2008) and Awodele, (2011) propose that the validation process comprises of the following four steps:

- 1) Validity of a conceptual model;
- 2) Validity of a computerised model;
- 3) Validity of an operational model; and
- 4) Validity of the data used to develop and validate the model.

They explain that the first stage in the model validation process, the step relating to the conceptual model, entails assessing the degree to which the model’s representation of the problem entity is sufficiently reasonable. The second step relates to the computerised view of the model. This relates to the validation of the degree of correctness of the computerised model as a representation of the conceptual model. The third step includes operational validation, which is employed to determine whether or not the model’s output behaviour is sufficiently accurate for its intended purpose. The last step is the assessment of the validity of the data used to develop the model, and the data used for validation.

Model validation and evaluation are complementary in nature and are both required to prove the reliability and validity of a given risk management model. The validation is carried out in the web-based model development phase, to ensure that the conceptual model is structured correctly and the specifications of the model are clear, complete and that mistakes have not been made in implementing the model’s different phases. Furthermore, the model’s validation ensures that the model meets its intended requirements in terms of the methods employed and the results obtained. It is assumed

that validating the web-based model will fulfil the four steps of the validation processes mentioned above, for the following reasons:

- ✚ Validating the web-based model is also a validation of the conceptual model, as it expresses and translates the conceptual model's phases;
- ✚ Operational validity and validity of the data used to validate the model could be achieved by seeking the validity responses from expert personnel working on current projects that meet the intended purpose of the model, to compare their previous decisions with the model's decisions; and
- ✚ Data validation aspects have already been discussed extensively in the previous chapters of the thesis dealing with the qualitative and quantitative research strands.

For that reason, a feedback page was designed on the web-based model to gather the required validation to develop the model: after the user receives the final report recommendation and presses the 'End' button, the model will save a record for the examined project to be reviewed in future and will transfer the user to the feedback page. An explanation of the purpose of the feedback questionnaire is written first, and then evaluation questions will commence, as shown in Figure 7.20.



## Feedback



As an ongoing PhD research project, your point of view is crucial for the development of this model. Your comments will provide valuable help to make sure that this model can be used in both practical and theoretical fields of the construction industry.

As explained in the introduction section, this model by applying Risk Management tools and techniques to identify risks surrounding an investment opportunity in PPP projects aims to contribute to the enhancement of the organisation's performance; through achieving the organisation's strategic goals at the bid/no bid decision.

1) From your experience and knowledge, please evaluate the model's inputs and outputs according to its performance based on the following Likert scale: from 1 to 5, where 1 is Low and 5 is High

- A. Efficiency of the model:  1  2  3  4  5
- B. Comprehensiveness of the model:  1  2  3  4  5
- C. Intelligibility and clearness of the model:  1  2  3  4  5
- D. Logical structure of the model:  1  2  3  4  5
- E. Practical relevance to the subject:  1  2  3  4  5
- F. Applicability to practitioners:  1  2  3  4  5

2) Please indicate your satisfaction level of the model's processes based on the following Likert scale: from 1 to 5, where 1 is Low and 5 is High

- A. Buy/Not to Buy Decision:  1  2  3  4  5
- B. Pre-Bid Phase (Mandatory Factors):  1  2  3  4  5
- C. Bid/Not to Bid Decision:  1  2  3  4  5

3) Please state the strong points of the model

4) Please state the weak points of the model

5) Please state any suggestions to develop the model

6) Would you like to receive a final version of this model after the development? If yes; please tick the following box.

Yes, I would

**Submit**

**Figure 7.20: Feedback Page in the Web-Based Model**

### 7.4.1. Validity Approach and Participants

The validity approach includes both quantitative and qualitative methods to best achieve accurate evaluation. The quantitative method adopted the Likert scale technique for closed-ended questions, in order to unify and generalise the participants' responses in the questions that need such types of specific answers. In contrast, the qualitative method adopted the exploring technique by open-ended questions, in order to investigate and collect different data based on different points of view and experiences of participants. Thus, the first and second questions use the Likert scale to gather the participants' opinions about the model function and recommendation results, while the following three questions use open-ended questions to gather as much information as possible about the participants' opinions regarding the strengths and weaknesses, and their suggestions.

Regarding the participants, after the model has been approved by the supervisor, they were selected based on the intended purpose of the model. In particular, expert personnel involved in PPP projects were selected, as the model aspires to help decision makers to take the rational bidding decision for PPPs in the Saudi Arabian construction industry. Thus, the model's website was sent by email to random organisations working in PPPs in SA, with a request for it to be evaluated on their current projects by their top management. Twelve responses were returned without any missing data and were suitable for the validation phase of the thesis. The participants' information can be found in Table 7.5.

**Table 7.5: Feedback Participant Information**

Code	Job Function	Years of Experience	Annual Business Volume in SR	Type of Main Client
P 1	Decision Maker Rep.	29	> 50 M	Both sectors
P 2	Project Manager	22	> 50 M	Both sectors
P 3	Finance Manager	17	> 50 M	Both sectors
P 4	Decision Maker Rep.	26	> 50 M	Both sectors
P 5	Project Manager	18	> 50 M	Both sectors
P 6	Finance Manager	16	> 50 M	Both sectors
P 7	Decision Maker	12	< 50 M	Both sectors
P 8	Decision Maker	7	< 50 M	Both sectors
P 9	Decision Maker	9	< 50 M	Public
P 10	Decision Maker	10	< 50 M	Public
P 11	Decision Maker	6	< 50 M	Both sectors
P 12	Decision Maker	7	< 50 M	Public

## 7.4.2. Evaluation Results

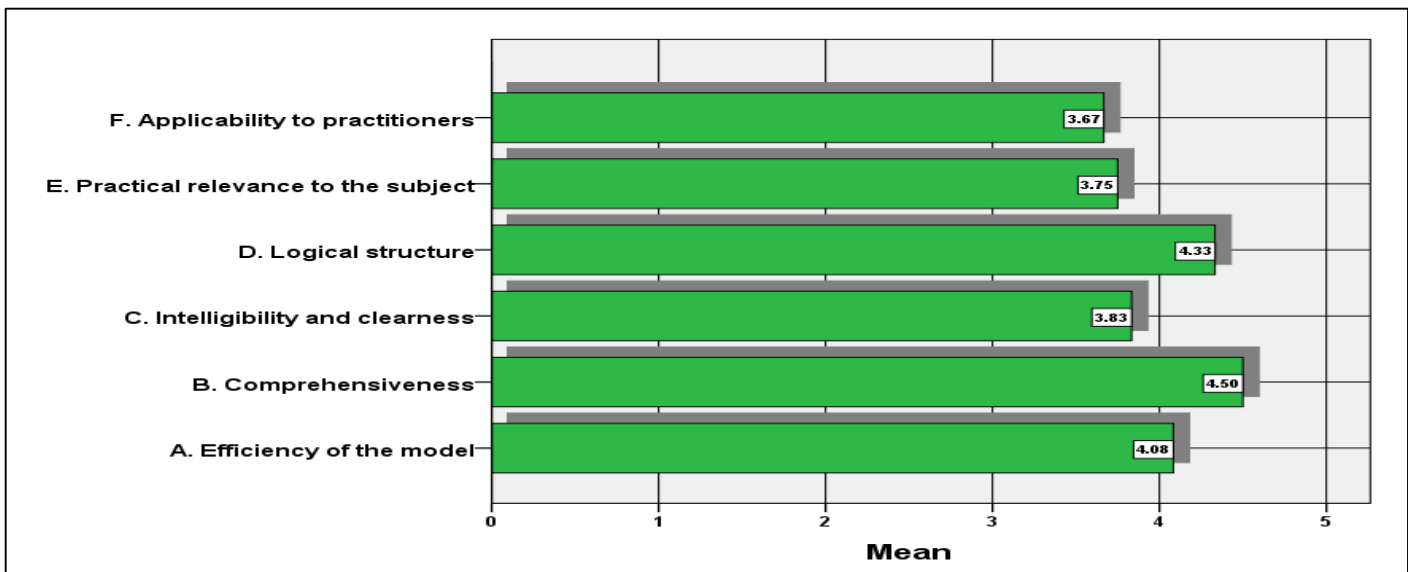
In this section, the evaluation results of the web-based model will be presented and discussed based on the type of the questions asked in the feedback questionnaire.

### 7.4.2.1 Quantitative Evaluation Results

Two questions in the feedback questionnaire used the Likert scale. The first question asked participants to evaluate the model's inputs and outputs according to its performance using the Likert scale from 1 to 5 for their answers, where 1 is Low and 5 is High. The performance assessments consist of the following criteria/aspects: A. Efficiency of the model; B. Comprehensiveness of the model; C. Intelligibility and clearness of the model; D. Logical structure of the model; E. Practical relevance to the subject; and F. Applicability to practitioners. The average mean used to analyse the participants responses and the results are presented in Table 7.16 and Figure 7.21.

**Table 7.6: Results of the Evaluation of the Model's Performance**

Descriptive Statistics for Question One				
	N	Minimum	Maximum	Mean
Efficiency	12	3	5	4.08
Comprehensiveness	12	3	5	4.50
Intelligibility	12	3	5	3.83
Logical Structure	12	4	5	4.33
Practical Relevance	12	3	5	3.75
Applicability	12	3	5	3.67
Valid N (listwise)	12			



**Figure 7.21: Bar-Chart of Results of the Evaluation of the Model's Performance**

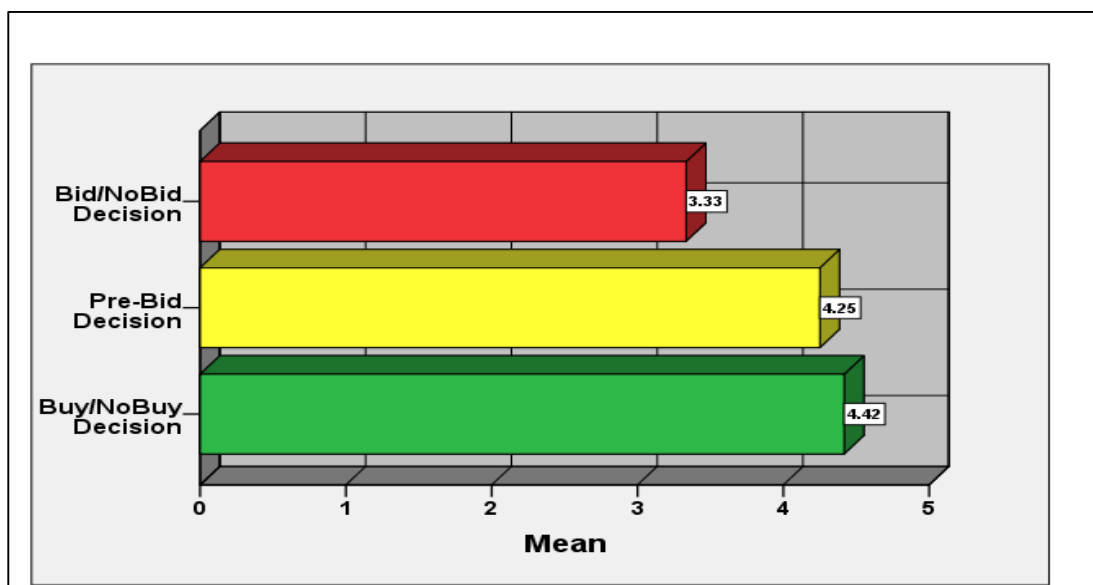


It is clear from the above results that positive responses were scored, which motivates the aim of the research. The highest average performance scores were given to the comprehensiveness criterion of the model, while the lowest average scores were given to the applicability to the practitioners' criterion. Although the applicability to practitioners' criterion is the lowest average score amongst the other criteria, it scores 3.67 out of 5; which can be considered as a positive score. Moreover, further clarifications of the practitioners' ambitions and needs can be understood through the qualitative evaluation results.

The second question, which used the same Likert scale, asked the participants to score their satisfaction level of the model's processes and results regarding the following recommendations: A. Buy/Not to Buy Decision, B. Pre-Bid Phase (Mandatory Factors), and C. Bid/Not to Bid Decision. The results of this question are shown in Table 7.7 and Figure 7.22.

**Table 7.7: Evaluation Results of the Outputs of the Model's Processes**

Descriptive Statistics for Question Two				
	N	Minimum	Maximum	Mean
<b>Buy/No Buy Decision</b>	12	3	5	4.42
<b>Pre-Bid Decision</b>	12	3	5	4.25
<b>Bid/No Bid Decision</b>	12	2	4	3.33
Valid N (listwise)	12			



**Figure 7.22: Bar-Chart of Evaluation Results of the Outputs of the Model's Processes**

This question aims to obtain the participants' level of satisfaction and their agreement regarding the model's processes in terms of the model's output and its accuracy with what they apply in their practical field towards the bid/no bid decision for a PPP project. The participants' evaluations in this question are crucial for the validity of the need for this research. The participants scored the output all of the three processes positively, with high scores reflecting their general agreement with all of the model's recommendations. However, there are slight differences in their scores for each decision output, where the highest average score was given to the first decision recommendation 'buy/not to buy'; whereas the lowest average score (3.33 out of 5) was recorded for the 'bid/no bid' decision recommendation of the model.

#### ***7.4.2.2 Qualitative Evaluation Results***

The scores in the previous questions were further reinforced by the other, general, qualitative questions. The three questions in this section aim to illustrate the participants' views on the strengths and weaknesses and their suggestions on these points after testing the model, based on their experience and knowledge in the practical field. The questions applied the open-ended method as the most suitable method to gather as much information as possible from the participants, especially as different classes of organisations with different backgrounds of participants are involved in the validation process. The following sections will summarise answers for each question.

For the 'Strong Points' of the model, the following comments were recorded:

- ❖ P1 stated: *it is a useful tool for decision making, it offers the logical precaution needed for identifying risks in international PPP projects.*
- ❖ P2 stated: *excellent strategic link to the bidding decision, and the factors considered are important for the decision.*
- ❖ P4 stated: *the divided process of the model are based on both logical and practical knowledge.... And I completely agree with the model's decisions.*
- ❖ P7 stated: *comprehensive considerations of risk factors with concrete recommendations.*
- ❖ P10 stated: *I discovered a lot of strategic risks in this work.*
- ❖ P12 stated: *very interesting piece of work, it is helpful to take rational decisions.*

For the ‘Weak Points’ of the model, the following comments were recorded:

- ❖ P3 stated: *the decision will be supported with financial elements as well, which this model does not cover them.*
- ❖ P5 stated: *I think there is one weak point, users cannot delete some factors.*
- ❖ P6 stated: *I can understand the importance of the bid/no bid decision, but the bidding decision will be based on both bid/no bid and mark-up decision.*
- ❖ P8 stated: *I am not sure about the confidence level of the decision.*
- ❖ P9 stated: *it is not suitable for sub-contractors involved in the project.*
- ❖ P11 stated: *it is not clear how to link the strategy to the decision.*

For the ‘Suggestion Points’ in order to develop the model, the following comments were recorded:

- ❖ P3 stated: *it would be more accurate if the model is combined with a financial model.*
- ❖ P9 stated: *the ability of the user to delete some factors.*
- ❖ P11 stated: *it needs examples to clarify some factors.*

The feedback results are rich in ideas and future development plans. Moreover, the strong points of the model motivate the need and the aim of this research; even though there are some weak points that will be discussed further in the limitation section of the conclusion chapter, the high scores gained in the evaluation and the strong points mentioned give more indications about the need for such a model.

## **7.5. Summary of Chapter Seven**

This chapter presented the development phase of the web-based model in order to deliver the prime aim of this thesis. Thus, this chapter started with the construction phase of the web-based model, explained the different processes involved in the model, and finally shed light on the evaluation results. Findings of the feedback questionnaire, which adopted both quantitative and qualitative questions for the validation purpose, were presented. Valuable comments regarding weaknesses and suggestion points were collected and considered to be discussed further in the conclusion chapter.

## **CHAPTER 8: CONCLUSION AND RECOMMENDATIONS**

### **8.1. Introduction**

This chapter sets out the final phase of this thesis, which is phase five of the research design. In particular, this chapter details the findings achieved and conclusions drawn, limitations of the research, and recommendations for further research. Finally, reflecting the whole research process, the main contribution to knowledge is assessed and the contribution of other researchers and critics is invited. A risk management perspective is adopted in this study as the main philosophy that guides the harmonious and consistent overlapping of inputs and outputs of other areas knowledge involved in the study. In particular, project risk management processes were implemented in this study to provide international contractors with a strategic decision model for PPP projects in the Saudi Arabian construction industry.

In detail, this model will help international contractors to apply risk management as a way of working in order to make rational decisions, where the model is a strategic tool that helps decision-makers to conduct the following processes: to plan risk management for a PPP project, to identify risks in international PPPs, and to perform both quantitative and qualitative risk analysis.

Also, the Government can benefit from the use of the model in order to evaluate international contractors for possible partnering risks, as these risks factors should be considered, transferred or shared, and responsibly allocated between partners in order to achieve a win-win relationship. Hence, dealing with the project risk response and control processes will be easier to achieve if the previous processes are adequately and effectively considered. The main motives to develop such a model are based on the fact that a rational and logical bid/no bid decision will affect the achievement of success at both organisational and project levels, and also the fact that there is no available bid/no bid decision model for international PPP projects that links the organisation's strategy and its current situation with its bidding decision.

## **8.2. Main Findings**

In this research, there are findings from each phase of the research design. This section is summarising the finding based on the output of each phase.

### **8.2.1. Main Findings of Phase One: The Literature Review**

This phase reflects the pressing need for this study. The subject of the research and the rationale and background behind the study were introduced, through identifying the main problem and the gap that needs to be addressed in this study, as well as the manner in which this problem has been previously investigated, through a review of the available literature. The findings of this review can be summarised to the following points:

- ❖ The bid/no bid decision is a strategic decision that has crucial and direct effect at both organisational and project levels;
- ❖ Seeking success in a strategic bid decision necessitates the importance of adopting a strategic project management (SPM) approach for the project's orientation to the organisation, by adopting portfolio project management (PPM) and risk management (RM) as strategic tools that enable SPM to be aligned with the mission, goals, and objectives of an organisation. In other words, this allows the organisation's strategy to be linked across its three levels (strategic, tactical, and operational), and thence success can be achieved at both organisational and project levels;
- ❖ The extant literature has emphasised that this strategic alignment is crucial for project selection and strategic bidding decisions, in order to make successful investment decisions;
- ❖ The review established the importance of risk management tools and techniques at both organisational and project levels. In particular, the literature recommends applying the risk maturity model to assess the risk management capability of a construction organisation's management in a dynamic environment such as the construction industry, in order to benchmark its activities and recognise what is missing;
- ❖ In terms of the project level, the review focused on the strategic bidding process of a construction project, especially in PPP overseas projects, from the perspective of risk management. The findings of other researchers in relation to risk

identification for the bid/no bid decision in a construction project were used to generate a list of critical success factors, gathered from the comprehensive review of the literature in this area;

- ❖ After reviewing previous literature concerning bidding-decision models and critical success factors, it was found that none of the previous studies had established a link between the strategic project management and the bid/no bid decision for international PPP construction projects from the perspective of risk management;
- ❖ It was also found that none of the previous studies had established a multi-criteria-decision-model (MCDM) that is capable of facilitating contractors bidding decisions by considering their strategic policies and assessing their current situation for effective and successful decisions, in addition to the unique criteria and sensitive PPP policy of the project; and
- ❖ 237 key factors were identified from the literature review, which related to the following subjects: bid/no bid decision key factors, public private partnership CSFs, and international construction CSFs. These factors were examined in terms of their applicability and efficiency to the Saudi Construction industry.

### **8.2.2. Main Findings of Phase Two: The Qualitative Research Strand**

The findings of Phase Two confirmed the findings of the literature reviews in terms of the importance of the research aim and objectives and the need for such a decision model to address international investors' bidding decisions from the perspective of risk management for PPP projects in Saudi Arabian construction industry. The adoption of a triangulation approach involved a mixed methods technique consisting of an exploratory study in the form of qualitative interviews, while followed by the main quantitative research, an empirical confirmatory study, in the form of a questionnaire survey, using the method.

The interviews were conducted with local and international expert personnel working in the Saudi construction industry from both public and private sectors. The findings distinguished the most applicable factors, from those initially collected from the literature review, to be adopted in the model-input and which suit the Saudi construction industry. This resulted in seventy-seven factors to be examined and ranked in the next phase by the questionnaire survey. Additionally, the interview findings provided a rich insight into the

practical situation of the decision-making processes. The interviews highlighted the importance of the research topic, and the findings can be summarised in the following points:

- ❖ Careful project selection is a key success strategy for the success of the whole project;
- ❖ Technical and financial evaluation of the project are vital steps for rational and successful bidding decisions;
- ❖ Risk identification techniques are the route to achieve project success in order to be ‘armed’ and prepared for ‘unhappy surprises’;
- ❖ The problem of poor bid/no bid decisions was found to exist in the Saudi context and some projects have been changed to the traditional procurement route; for example, the north-south railway network project;
- ❖ The findings emphasise that the decision making process and the evaluation of factors that affect bid/no bid decisions should be based on the organisation’s current situation, strategy, and policies, for accurate and effective decisions that fit the organisation’s capability and capacity. This supports the relevance of the research problem and the need for a strategic risk management decision model for PPP projects in the Saudi industry to enhance the effectiveness of the international contractors’ bid/no bid decisions;
- ❖ The findings suggested that some factors could be merged together as one factor for best results from the model-input, for example, the political factors could be included in the cluster of international investment factors, rather than repeating the same factors in other clusters;
- ❖ Some critical factors are interfering and interacting with other critical factors from another cluster, for example, some factors of the bid/no bid decision cluster interfere with other factors from the PPP and/or the international investment cluster. Thus, there was no need to repeat them again in the same model-input when considered in one cluster;
- ❖ The findings thus generated a revised and combined set of factors, in particular, seventy-seven factors that have potential influence on the bid/no bid decision and it was decided that these should therefore be examined in the questionnaire survey and then be used in the model construction phase. The factors and their categories can be seen in the Table 4.2;

- ❖ Overall, certain factors were found to be more important and more critical than others, in other words, some factors can directly affect the result of the decision. Thus, these were applied in the model in the pre-bid decision phase as mandatory critical factors; and
- ❖ The initial concept of the model was validated in this phase in order to be developed to its final form.

### **8.2.3. Main Findings of Phase Three: The Quantitative Research Strand**

Following the pragmatic epistemology underlying the research design, the third phase of the research was conducted through a quantitative questionnaire survey. The results of this survey confirmed the findings of the literature review in terms of the importance of the elements laid out in the research aim and objectives: that is, the need for such a decision model to address international investors bidding decisions from the perspective of risk management for PPPs projects in Saudi Arabian construction industry.

Through an analysis of the results of the questionnaire survey, which was conducted quantitatively under the random-purposeful sampling type, the seventy-seven factors affecting the bid/no bid decisions were ranked based on their weight of importance.

The findings of this phase contributed to achieving the aim and objectives of this research. In particular, they helped to achieve the objectives of identifying bid/no bid decision factors, PPP success factors, and international investment success factors gathered from both the literature review and the practical points of view in the field. The importance level of these factors which were adopted and applied in pursuing the main aim of this research can be found in Table 5.17.

Also, in this phase, a statistical analysis of the questionnaire survey was conducted, to investigate different behaviours of the participants in parallel with their differences, in terms of their organisations' features, that is, the classification status, type of work, annual business volume, and the main client type. Generally, the findings of the statistical analysis contributed to the study's aim and objectives and, in particular, to the following objectives: investigating the different behaviours of contractor's organisations during the process of decision-making, investigating the link between organisations' RM practice



and decision making processes, and investigating the need for a rational RM strategic decision model for PPP projects.

To sum up, these findings helped to distinguish the behaviours of different sized organisations with different main type of clients, in order to consider these differences in simulating practical situations for the construction phase of the desired model. In addition, the findings helped to configure the final concept of the model which was designed and applied in the next phase.

#### **8.2.4. Main Findings of Phase Four: The Model Development and Validation**

In this final phase of the research design the final conceptual model was developed, and the web-based model, which is available at [www.srmdm.com](http://www.srmdm.com), was constructed. Participants' opinions and feedback were then gathered to examine the model's effectiveness and validate the model's final concept.

In brief, after evaluating the initial concept of the model, during the qualitative research strand, and after analysing the data collected via the quantitative research strand; the final concept of the model was developed to fill the gaps identified in the thesis. In particular, in order to be constructed on a rational basis, the development of the model, took into account the following objectives:

- ❖ To link the organisation's strategy with its bidding-making processes;
- ❖ To assess the organisation's current situation for an accurate and concrete bid/no bid decision;
- ❖ To be a suitable model for small, medium, and large contractor organisations;
- ❖ To be a suitable model for organisations inexperienced with the public sector;
- ❖ To consider key risks factors affecting bid/no bid decisions for large sized construction projects;
- ❖ To consider critical success factors for public private partnership projects; and
- ❖ To consider critical success factors for international construction.

In addition, this phase shed light on the evaluation results. Positive comments regarding the strong points were made, and valuable comments regarding weaknesses and suggestion points were collected, which will be discussed in the limitations and recommendations for future research sections below.

### **8.3. Meeting the Research Aim and Objectives**

The following sections give details of the research design processes executed to address the aim and objectives within the research.

**The Prime Aim of This Research:** is to provide a strategic investment decision model, from the perspective of risk management, for international contractors who intend to invest in public private partnership projects in the Saudi Arabian construction industry. The research aim was achieved through meeting the six objectives as described below:

**Objective One:** To establish a link between risk management processes, the organisation's strategy and its current situation, to facilitate the process of making the bid/no bid decisions.

This link was achieved and established in phases one and two of this study, the literature review and the qualitative interviews. The research design processes started with a literature review phase in order to review relevant knowledge, to collect required data for the identified gap, and to establish an academic background to the subject. It was found that the absence of a rational bid/no bid decision is a key risk that affects the survival of the organisation and the success of its projects. It is clear from the literature that bid/no bid decisions need extensive and comprehensive risk identification processes to achieve confident and successful bidding decisions. Moreover, it was found that bid/no bid decisions should be linked to the organisation's strategy and its current situation for concrete and accurate bidding decisions.

This linking requires the contractor organisation to implement strategic project management; as seeking success in a strategic bid decision necessitates the organisation's strategy to be linked across its three levels (strategic, tactical, and operational), and thence success can be achieved at both organisational and project levels, as pointed out above.

Bidding for PPP projects overseas without efficiently applying risk management tools and techniques to evaluate both the project and the organisation's current situation and capability might result either in large losses or consumption of time and resources that could have been avoided.

The conducted interviews confirmed the findings of the literature, determined the factors needed for the organisation's current situation, and clarified the bidding making processes adopted in the final model, in addition to identifying the criteria needed to link the organisation's strategy with its bidding decisions. Finally, it is found that risk management is capable of assessing and identifying both organisational and project levels of an organisation to make sure that a risk culture is adopted and risks are adequately identified and analysed for bid/no bid decisions and more further.

**Objective Two:** To investigate the different behaviours of contractor's organisations during the process of decision-making, according to their differences in terms of classification status, size, main client type and type of work.

This objective was achieved in phase three of the research design via the quantitative questionnaire survey. This objective investigated the expected relationship between participants' responses in terms of a set of variables; these variables are the contractor organisations' classification status, business annual volume size, type of work, and main client type. It was found that that differences of the organisation's size (medium or large) and main type of client (public or private) play a key role in their behaviour towards decision making. In particular, there are differences in their behaviour in terms of proposed-project evaluation prior to bidding stage, and methods used to evaluate projects and identify risks. This could be explained as being due to the organisation's culture in terms of whether they adopt risk management effectively and whether risk management tools and techniques are embedded as an integral part of the project, and as a way-of-work culture that is undertaken as part of the day-to-day operations. For this reason, the model applied a user identification process, in order to identify the suitable importance indices of the applied factors, based on the different behaviours of contractor organisations that existed in the real field.

**Objective Three:** To identify key factors affecting bid/no bid decisions for potential construction projects.

Previous studies have identified bid/no bid factors for different construction industries. Most of these studies relied on the identification of the factors investigated in the study by Ahmad and Minkarah in 1988. It was found that each of these studies identified factors that were associated with the area of the construction industry under investigation, with different levels of importance assigned to each factor, and some identified factors which are not mentioned in other studies.

In particular, even though the principal factors influencing bid/no bid decisions for construction projects may be comparable across the globe, several factors related to a local industry, socio-economic, environmental and cultural issues further contribute to such decisions, introducing a high level of heterogeneity across contractors in terms of their intrinsic bid/no bid preferences, and responses to decision to bid factors. Hence, this necessitated a revision of the identification of these factors, which also provided an opportunity for this research to re-examine and identify these factors and establish an index of their importance with respect to the bidding environment in Saudi Arabia. These factors were then adopted in the thesis output for a strategic risk management bid/no bid decision model for international PPP projects in the Saudi Arabian construction industry.

Thus, this objective was achieved via phases one, two, and three of the research design. In the first phase, a comprehensive review of the literature interested in bidding decisions resulted in identifying 112 potential factors that could affect contractors bid/no bid decisions, which can be found in Table 2.1, to be examined in the second and third phases of the research design. As a result, the returned factors, investigated in phase 2 and ranked in phase 3, contributed to the final set of factors to be applied in the model's input factors, which can be seen in Table 4.2.

**Objective Four:** To identify critical success factors for public-private-partnership projects from the perspective of risk management.

It is evident that researchers worldwide are interested in exploring the best ways of delivering PPP projects. Undoubtedly, this area of PPP investigations will continue to be

of great interest to researchers in future, as the PPP market keeps growing and maturing in other authorities and sectors. However, despite the increasing interest in the critical success factors for PPP projects (PPP-CSFs), in the literature little attention has been given to the need for review and analysis of the factors that have already been identified in previous studies, in particular, with respect to the existing construction boom in Saudi Arabia, The present review in this thesis tried to fill this gap, particularly examining the applicability and importance levels of these critical success factors to local and international contractors who intend to invest in the Saudi construction industry under PPP schemes.

Since the evolution of PPP, a number of researchers have employed the concept of CSFs to enhance the understanding of and best ways of implementing PPP policy for infrastructure development. This concept has been employed in a diversity of PPP arrangements, ranging from different infrastructure sectors, project models, and stages within the PPP arrangement. Hence, the review of the literature interested in the PPP-CSFs found 60 factors, which can be seen in Table 2.2. Thus, like the previous objective, this objective was achieved via phases one, two, and three of the research design: specifically, identified in the first phase, examined in the second phase, and then ranked in the third phase of the research design. As a result, the returned factors contributed to the final set of factors to be applied in the model's input factors, and can be seen in Table 4.2.

**Objective Five:** To identify critical success factors for international construction projects from the perspective of risk management.

In this study, it appears that as international bidding decisions become difficult and complicated, construction firms seem to be increasingly risk averse, and some tend to make international entry decisions based on personal intuition or past experience. In general, it can be argued that decision-making tends to suffer deviation from rationality, especially during uncertain situations faced by international contractors.

In this study, the international construction critical success factors (IC-CSF) were categorised into seven clusters that consist of political, economic/business, financial, climatic/geographic, project related, local management, and local partners factors. This

objective was achieved via phases one, two, and three of the research design. Based on the review of the literature regarding IC-CSFs, 65 factors were identified in this study, which can be seen in Table 2.3, and were examined in the second and third phases of the research. As a result, the returned factors, which has been investigated in phase 2 and ranked in phase 3, contributed to the final set of factors to be applied in the model's input factors, and can be seen in Table 4.2.

**Objective Six:** To construct a web-based strategic decision model of PPP projects for international investors from the perspective of risk management that can accommodate the previous objectives, in order to facilitate the process of decision making.

This objective was achieved in phase four of the research design. Chapter 7 of this study introduced the constructed web-based model accommodating a database facility to establish a recording mechanism for the evaluated projects, a method that provides information about the current situation of the company, and a method to identify the model user were integrated with the developed model. The integration inputs are based on the findings of the literature review (phase one), the qualitative interviews (phase two), and the questionnaire survey (phase three). It was established that including these method will results in facilitating the process of the bid/no bid decision and will acknowledge our limitation in processing the data. The developed application aims to contribute to the problem-solving aspects of the decision making process. Hence, it will help contractors to consider and assess critical success factors needed to make a rational bid no/bid decision in an easy and user-friendly tool. This was confirmed as being able to save time and effort to the contractors and will help to consider risks associated in such a strategic decision as the bid/no bid decision.

#### **8.4. Contribution to Knowledge**

The findings from this study make several contributions to the current literature. The main one is the web-based model which has been developed based on the comprehensive literature review and practitioners' experience, and that can thus be regarded as valid and reliable within the Saudi PPP context, and possibly, by extension, to other countries sharing similar immature PPP environment to that of Saudi Arabia.

The model highlights the influence of six major phenomena, seven categories, and seventy-seven critical success factors affecting international contractors bid/no bid decisions for PPP projects in the Saudi Arabian construction industry; it therefore represents the following: a comprehensive account of both the organisation's and project success, a rich source for international PPP risk identification, and a blueprint for effective implementation of risk management tools and techniques at the same time.

For the academic contribution, the study outcome adds to the growing body of literature on risk management in PPP projects, especially, for the Saudi Arabian construction industry. Moreover, the finding adds significantly to both international PPP literature and bid/no bid decision literature. The model is the first to facilitate international contractors bid/no bid decisions for PPP projects in the Saudi Arabian context from the perspective of risk management. In detail, it is the first model that develops a web-based model that organises the bid/no bid decision in a rational, logical, flexible and user-friendly manner, with consideration to the bidding risks in PPP projects, critical success factors of PPPs, and critical success factors for international construction. All of these features are combined together in the model's function with linkage to the contractor organisation's strategy and current situation at the time of the decision; where the strategy will be in terms of policy criteria influencing the organisation's behaviour towards bid/no bid decisions. Therefore, international investors intending to invest in Saudi Arabia can rely on the model as a knowledge base, and use the model to identify risks and assess their decisions. Hence, this study can provide a solid platform for future studies concerned with enhancing the appreciation of current risk management practices in international PPP projects.

Moreover, regarding the practical contribution, the model represents a development of previous models concerning the bid/no bid decision model, as it has made improvements over previous models that considered the same decision. These improvements include: facilitating the decision-making processes to the similar situation in the practical field in the Saudi industry, and then aiding decision-makers to make the right decision in each process (accepting the invitation, buying the bid documents, and bidding for the proposed project); the model helps inexperienced contractors to learn how to make the bid/no bid decision with rational thinking and to benefit from the knowledge of the experienced contractors who provided the weights of importance for each factor considered.

Moreover, a recording mechanism for the evaluated projects that captures the relevant strategy and situation of the company at the time of the decision is integrated within the developed model for learning or further assessment purposes.

## **8.5. Limitations of the Research**

Seeking perfection is every researchers' dream, which is why some researchers spend extensive time or write enormous numbers of pages on their research. However, producing a perfect piece of research is a difficult claim to make. Hence, as with all research studies, this one is not an exception and has a number of limitations, but, essentially, these are unavoidable given the project choices made.

Developing a model can involve numerous processes, depending on the number of variables incorporated, the range of assumptions taken, and the type of output required. The final bid/no bid decision model presented in this research thus has the following limitations:

- ✚ It focused on the Saudi Arabian construction industry, and particularly the immature situation of the PPP policy there. Consequently, generalisation of the findings may not be easily made to PPP projects internationally. That said, the findings may well be generalised to other countries in the Middle East, due to the unique type of undertakings, for the very many reasons indicated in the thesis, not least because of the similarity of the Saudi customs and traditions to those in these countries ;
- ✚ The model used main variables to identify the application user based on the PPP policy situation existing within the public authorities in order to accept the tender of an international investor, which could be unsuitable for other construction industries;
- ✚ The weight of importance assigned for the model inputs/factors were identified from practitioners' working in the Saudi construction industry. Although most of those practitioners are international expert personnel, they gave their judgements and points of view based on their experience in terms of the Saudi PPP situation; and



- ✚ The model is limited to the bid/no bid decision. Nevertheless, the model or the study in general is not neglecting the importance and need for the mark-up bid decision for a final bid decision to be made, but the focus of the study is on the first bid decision, which is the strategic project selection bid or the bid/no bid decision.

## **8.6. Recommendations for Further Research**

Directions for further research naturally flow from the limitations of the study, and are suggested as follows:

- ✚ Further research is needed to enhance the generalisation of the research findings to other countries. This could be achieved by examining the applied factors on different construction industries within mature PPP environments, which will generate new importance indices, and therefore can be used for generalisation to international PPP critical success factors;
- ✚ Further research is needed to consider the impact of more main variables suitable for a mature PPP environment, and also will add for generalisation purposes as well. Such a development could be considered important for further research as the model is designed based on two main variables only (business annual volume size and the main client type), where the other two variables (the organisation's classification status and type of work) were similar for all of the participants involved in this study;
- ✚ Further development of the web-model is needed to consider adding or deleting more factors or options in the developed model, and to add more examples or explanations to each factor considered for more intelligibility purposes; and
- ✚ Finally, further research is needed to provide a mark-up decision model to be compatible with this model for a final unified bid decision, which would be highly appreciated, based on the weak points identified in the validation stage of the model.

## **8.7. Final Comment**

The researcher, from both an academic and personal attitude, would be more than happy to help or assist people interested in this research for development purposes or for sharing the knowledge and experience. The rationale behind selecting this topic was the sudden PPP boom in Saudi Arabia construction industry and the gap identified in the literature. Finally, this research is not a holy book, and I will appreciate any criticism to be given from both research readers and the web-based model's users for future development.

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# APPENDICES

## Appendix A: The Request for Permission Letter

**Heriot-Watt University**  
**The School of the Built Environment**



December 7, 2010

Subject: **Request for permission and cooperation in obtaining information**

Dear Sir,

Eng. Saud Al-Otaibi is a doctoral student at the Construction Management & Surveying field of study in the School of the Built Environment, Heriot-Watt University. The title of his research is "*International Contractors' Decision to Invest; The Strategic Risk Management Decision Model for Public Private Partnership Projects*". The prime aim of this research is to provide a strategic investment decision model, from the perspective of risk management, for international contractors who intend to invest in public private partnership projects. This multi-criteria decision model will be developed into a computer-based model for Public-Private-Partnership (PPP) projects.

The research work will require extensive gathering of relevant data such as documents related to PPP projects. The methods for this purpose will include interviews, documents review, questionnaire surveys, etc. Therefore, it is hoped that your support and cooperation will enable the student to gather required information; so that the research's final output can provide a useful contribution for both the knowledge and business industry.

For such purposes, Eng. Saud Al-Otaibi and the researcher supervisors would like to ask for your permission and support in obtaining information on projects developed through public-private-partnerships by your organisation. The information will be obtained through the following stages:

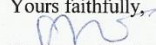
1. Questionnaire and interview session with key personnel involved in the project.
2. Gathering other relevant documents related to the project, such as project contracts, project routine progress reports, list of parties involved in the project, etc.


Since the sources and substances of information are essential to the success of this research, your kind support will enable him to derive maximum benefit from his research work and produce valuable contribution. Please be assured that any given information will be treated as strictly confidential and used only for academic purposes; where your name and/or your organisation's name will not be mentioned explicitly/directly in this study unless you permit to do so. In fact, the focus will be towards collecting data that leads to results could assist in achieving this study's aim.

The research team will be pleased to send to you a summary of the results as soon as they become available in case you wish to do so. Please do not hesitate to ask any question to the research team.

Thanking you in anticipation of your kind consideration.

Yours faithfully,

  
**Professor Stephen Ogunlana,**  
S.O.Ogunlana@hw.ac.uk  
First Supervisor,  
School of the Built Environment- HW University

  
**Dr. Graeme Bowles,**  
G.Bowles@hw.ac.uk  
Second Supervisor  
School of the Built Environment- HW University

For any clarification regarding any question, please feel free to contact Eng. Saud Al-Otaibi on mobile no. (UK) 0044 7833209051 or (SA) 00966 554209030 or email: [ssa26@hw.ac.uk](mailto:ssa26@hw.ac.uk)



## **Appendix B: The Questionnaire Survey**

To be attached as an Excel file.











## **Appendix C: Publications**

- 1) A Conference Paper in the 4<sup>th</sup> Saudi International Conference 2010 (SIC2010) (29<sup>th</sup> - 31<sup>st</sup> July 2010), Manchester: The University of Manchester;**

Conference Paper Title:

International Contractors' Decision to Invest: the Need for Risk Management Model for Public Private Partnership Projects

- 2) A Conference Paper in the 5<sup>th</sup> Saudi International Conference 2011 (SIC2011) (23<sup>rd</sup> - 26<sup>th</sup> June 2011), Coventry: The University of Warwick.**

Conference Paper Title:

Toward an Effective Organizational Project Management in Saudi Arabia

- 3) A Conference Poster in the 6<sup>th</sup> Saudi International Conference 2012 (SIC2012) (11<sup>th</sup> - 14<sup>th</sup> October 2012), London: Brunel University.**

Conference Poster Title:

International Construction Projects in Saudi Arabia: Risk Management Practical Factors for Public private Partnership projects

# **International Contractors' Decision to Invest: the Need for Risk Management Model for Public Private Partnership Projects**

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## **Abstract**

The need for a new model for public private partnership projects from the perspective of risk management is the subject of this paper. Such a model could increase the chances for success by international contracting organisations intending to invest in Saudi Arabia. This paper is part of a larger study towards doctoral degree by the first author. The authors present the background to the research and then shed light on the relationship between risk management and public private partnership scheme to implement a project, and then justify the need for a new model.

## **Introduction**

Under the traditional procurement route, the national government and local authorities in Saudi Arabia have been responsible for providing a wide and diverse range of public services, such as health, education, justice, and defence. The decision makers in the public sector realise that all of these services involve some form of risk; such as failure to achieve success targets of projects, delays, poor quality of work, inappropriate design, financial loss, fraud, waste, inefficiency, lack of service delivery in line with the contemporary modern style.

Nowadays, the Saudi government adopts PPPs scheme for constructing mega development projects; such as the new economic cities and railway networks in order to attract international investments to Saudi Arabia as well as to avoid constraints/risks associated with the delivery of such large projects. This new procurement approach is more prone to risks than projects executed under direct government finance (Ogunlana, 1997).

The objective of this paper is to recognise the need for a new investment decision model capable of addressing the risks associated with PPP projects in Saudi Arabia; which will enhance the chances of success for international investment. The prime goal is to provide decision makers with a professional strategic investment decision model for PPP projects from the perspective of risk management. The model is based on experience and literature reviews from the standpoint of project management.

## **Background to the research**

Broadbent and Laughlin (2003) point out that the adoption of PPPs scheme across a wide range of sectors and countries has increased dramatically at various stages of economic development since the 1980s. Also, they clarify that PPPs are a recent extension of what has now become well known as the 'new public

management' agenda for changes in the way public services are provided. PPPs involve organisations whose affiliations lie in the public domain and the private sectors working together in a partnership scheme in order to provide better public services.

Bing *et al.* (2004) draw attention to the reasons why the UK government launched a partnership approach between public and private sector in the first place. The reasons can be considered as advantages of this approach. This include: getting infrastructure costs off the public balance sheet, keeping investment levels up, cutting public spending and avoiding the constraints of public sector borrowing limits, as well as to construct projects successfully in terms of time, cost, and quality.

Also, the Institute of Public Policy Research (IPPR) emphasise in its report *Building Better Partnerships: "... people... demand better public services... However, to win this fight the case for public services needs to be made in terms of values and outcomes rather than particular forms of services delivery"* (IPPR, 2001, p.15).

However, the IPPR (2001) report makes clear that the provision of public services is still very close to the surface. For developing PPPs, the report emphasise that rather than the engagement in arguments for the failure in the role of the public or private sectors to provide better services the decision makers in partnerships scheme should analyse PPPs with an open mind in order to provide 'better' services. As explained by Broadbent and Laughlin (2003), in order to provide 'better' services by PPP scheme, it is the role of parties involved in partnerships; the way they are embarked upon and their ramifications for the provision of public services and accounting, auditing and the accountability implications of these relationships.

### ***The Saudi construction industry and the new experience of PPPs***

Falqi (2004) points out that the construction industry in Saudi Arabia is confronted with many challenges, where some challenges can be considered as a unique to the country while others are common in any construction industry. Beside the fact that owners share the three basic concerns: time, cost, and quality, there is considerable concern regarding the contract documents that can insure the capability of transmitting all of the owners' requirements to the main contractor. Falqi (2004) further explains that construction experts in Saudi Arabia have long recognised the extreme fragmentation of the industry; where the majority of contractors' organisations are small, unspecialised, undercapitalised, and financially unstable. He also points out that in most construction projects; the use of sub-contractors has become a common practice where specialised firms perform the majority of the work.

Regarding the performance of the construction industry, Falqi (2004) in his research on construction projects delay factors in both Saudi Arabia and the United Kingdom, states that the results of his research indicate that the average ratio of actual completion time of construction projects, when compared to the planned contract duration in both the Saudi and UK construction industries fluctuates between 110% and 130%. Additionally, this research results show that extensive delays in Saudi Arabian construction industry projects are considerably longer than in the UK; as 21% of respondents from SA experienced an average delay that ranged between 131% to over 200%. In general, for the Saudi construction industry, the majority of delayed projects could be considered as 'excusable delays' where owners bear the damages for all delayed time. In Falqi's research only 11% of SA respondents testified that contractors had paid liquidated damages for projects which incurred delayed time.

Currently, the Saudi Government has ambitious plans to build six new economic cities under the PPPs scheme. At a cost of more than \$60 billion, the Kingdom has planned and begun constructing four metropolitan marvels; a project that promises to significantly alter the economic landscape of Saudi Arabia while providing a wealth of 'Greenfield' opportunities to investors. The Saudi Arabia general investment authority (SAGIA) has launched four integrated Economic Cities, located in Rabigh (King Abdullah Economic City), Hail (Prince AbdulAziz bin Mousaed Economic City), Madinah (Knowledge Economic City) and Jazan (Jazan Economic City). According to SAGIA (2008) the objectives of the economic cities are to:

- Promote balanced regional development;
- Achieve economic diversification;
- Attract international investment to Saudi Arabia;
- Upgrade competitiveness; and
- Create job opportunities for citizens.

SAGIA's vision for the Economic Cities is to contribute more than US\$150 billion in annual GDP, to create over a million jobs, and to become home to 4-5 million residents by 2020. Serving the wide-ranging needs of these large communities will require immense private sector involvement. Fully utilizing their commercial and industrial potential will offer even greater opportunities for investment.

Also, under the PPP scheme; the Saudi Railway Organisation (SRO) intends to link the Saudi regions by modern railways network and services. According to SRO future plans for transport in the Kingdom of Saudi Arabia in 2025, the expected share of the railway sector for the transport of passengers would be 11% as compared to other means of transport for distances of 380-500 km. While an estimated 12.5% of the 850-980 km range, 9% distances for 1250-1400 km. In details, the study of the future plans of SRO estimates growth rate of 3.7% until 2025. As for the transport of goods, it has been estimated the share of the railway sector in 2025 to be 24% for a distance of 300 km, 40% for a distance of 900 km, and 48% for a distance of 1400 kilometres. The growth rate during the plan period is estimated to be at 4.8% per year. Based on these studies, estimates, and for other stimulating factors, the Saudi government adopted a strategic plan to develop railways services in the country. This plan includes a number of major projects to expand the railways network and services and a program to privatise the SRO.

The Saudi Ministry of Economic and Planning (MEP) encourages small-to medium-sized construction organisations to contribute to the delivery of the four economic cities. It is encouraging them to seek knowledge and experience and to adopt new tools and techniques in order to overcome obstacles such as uniqueness, complexity, size and technology which surround such large projects. According to MEP vision, small-to medium-sized private construction organisations will play a key role in Saudi development. However, they will be required to adopt and accept new knowledge and techniques in order to develop their performance and to accomplish projects successfully within time, cost, and quality specifications.

The extensive delays and budget overrun of Saudi construction projects require a great deal of attention towards the effectiveness of methods and techniques used by Saudi organisations to implement projects. This leads to the research question: "Are the methods, tools, and techniques of project management and risk management applied by Saudi and/or international contractor organisations for their projects in Saudi Arabia adequate in order to achieve project success in general and success in the investment decision in particular?". This question requires an assessment of the Saudi contractor organisations project management maturity level; to identify what will lead to project success. These success factors need to be considered in order to separate what is good from what is mediocre.

In addition to the above, for the international contractor organisation intending to conduct projects in Saudi Arabia, the pertinent is: "What are the success rates of investment there? What are the obstacles, risks, consequences and responsibilities of investors?"

Moreover, for the Saudi Government to attract the interest of international contractor organisations to invest in Saudi Arabia the question needing attention is: "What are the motivations, incentives, guarantees and services that the government should provide to the investors?"

This research aspires to provide solutions that can be recorded and developed. In order to obviate the problems in the construction industry and to encourage organisations to apply systematic project

management approaches and risk management tools and techniques as a way-of-working, rather than just using some of the tools and techniques.

### **Risk management (RM) and public private partnerships projects (PPPs)**

One major reason that projects are procured by PPPs is to enhance value for money by inviting the private sector to handle public works projects. However, whereas PPPs have been increasingly used in procuring capital intensive infrastructure projects all over the World, research shows that unless the risks in terms of financial, technical, managerial, environmental, and social are properly analysed, allocated and managed, the goals of a true value for money and a win-win partnership is hardly attainable (Cheung *et al.*, 2009).

In PPPs arrangements, the government's role in the delivery of infrastructural and public services changes from owners/managers to overseers, where the investors undertake far more responsibilities and assume more complicated risks than a mere contractor (Grimsey, 2002). As a result, using PPPs scheme, the public sectors try to transfer as many risks as possible to private enterprises and thus, shed their responsibilities.

However, each part engaged in PPPs will require a risk surcharge for each risk conveyed. How to fairly share the responsibilities of risks and the potential benefits between public and private sector bodies, or to achieve best possible risk transfer as against to maximum risk transfer when dealing with risk in PPPs projects, deserves further consideration in PPPs researches (Grimsey, 2002).

Thus, it is significantly important for both the public and private sectors to understand the various risks associated with PPP throughout the whole life cycle of projects, and especially in the strategic phase of a project, in order to guarantee a successful investment decision that leads to long-term success. This is especially true in Saudi Arabia and other countries where the use of PPP are still in the early stages of development.

### **International contractors' investment**

Lowe (2007) points out that statistics indicate the level of conflicts and disputes on international construction projects are much greater than in domestic markets. Therefore, it is essential for international contractor organisations to gain a detailed comprehension of root causes for such conflicts and disputes that are particular to conducting business in different foreign environments before making any decision to invest internationally.

The decision to enter international construction markets will come about due to a variety of reasons, but the fundamental motivation for organisations to seek work abroad is to take advantage of opportunities internationally, to increase the rate of growth and profits, and to develop their level of competition with other participating organisations (Howes and Tah, 2003; Lowe, 2007). However, research has found that there are primary strategic risks associated with international construction such as: political, economical, financial, climatic and geographic risks, alongside legislation and cultural aspects of foreign countries. All of these risks should be considered and addressed prior to making the decision to invest internationally.

### **The need for a new model for strategic investment decision**

Bageis (2004) points out that the project selection decision is one of the most critical business decisions; where contractors must realise the importance of the bid/no bid decision together with the project evaluation before committing themselves to a project. Thus, building a bridge between an organisation's strategy and its project selection decision seems to be fundamental in terms of success and improvement of the construction organisation.



In addition, Ofori (2003) clarifies that it is apparent that there are no existing models that are specifically applicable to international construction; especially for PPP projects. In details, Bageis (2004) clarifies that many models have been developed (six models) to help organisations in making their investment decision. It has been claimed that most of these models stayed in the academic loop and did not proceed to the practical world. Different techniques have been used to model the invest/not to invest decision, e.g. parametric solution, analytical hierarchal process, worth assessment technique, artificial neural network, NeuroFuzzy expert system, logistic regression and reasoning techniques. Also, it is found that there is no lack of techniques for the invest/not to invest decision, but there is a lack of an informative model for organizing the investment decision in a logical, flexible, rational and user-friendly manner with consideration to the organisation strategy and its current situation.

Therefore, the authors believe that a model for international investment allocated to the public private partnership projects, from the perspective of risk management is an essential need that will help to achieve success for international organisations and countries that will engage in PPPs projects. It is the intention of the research to develop such a model.

## Conclusion

To sum up, public private partnership projects are prone to many forms of risks. The level of risks increases when international organisations invest overseas. Since there is no international contractors' decision model to invest in PPPs projects and especially so in Saudi Arabia a living example for conducting mega PPPs projects for the first time using international organisations; the authors justify the need for a new model for international investment in PPPs projects from the perspective of risk management. It is the authors' intention to create such a model in the near future.

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# **Effective Management: Explaining Project Management In Saudi Arabia**

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The effective implementation of Project Management (PM) tools and techniques has a significant impact on project-based-organisation in terms of organisations' development, performance, and projects' success. This paper is part of a larger study towards doctoral degree by the first author. The methodology is on the basis of questionnaire-survey distributed to contractor organisations in the Saudi construction industry. The results benchmarked organisational PM capability and show that the majority of the contractor organisations (63.1%) have no or very limited awareness of PM profession. Also, the results found five strategic factors affect the effective implementation of PM in order to achieve success.

Keywords: Project Management, Construction Industry, PM Maturity Level, Effective Factors, Saudi Arabia.

## **Introduction**

“The project management approach is relatively modern” (Kerzner, 2006, p. 2). Four decades ago the Project Management (PM) approach was confined to U.S. Department of Defence contractors and construction companies. Nowadays, the concepts underlying project management are being practised in such various industries and organisations as defence, construction, banking, pharmaceuticals, hospitals, advertising, accounting, law, state and local governments, and the United Nations.

PM approach in Saudi Arabia (SA) can be considered as relatively young profession adopted effectively by only international organisations and multi-national or large-size organisations that have foreign experts working for their benefits, while some tools of PM are applied even inefficiently in small-to medium-size organisations that are responsible for the majority of failure projects in SA. Hence, PM maturity level in SA should be assessed in order to discover weakness, and the tools and techniques of PM should be adopted and applied effectively and efficiently.

Thus, the prime goal of this paper is to benchmark organisational project management capability; and then identifying and recognising strategic issues factors that affect the success of organisations' projects particularly for contractor organisations in the Saudi construction industry, and the awareness of the respondents towards these factors and towards the development of project management approach.

### **Background to the research: The Saudi construction industry**

Falqi (2004) explains that construction experts in Saudi Arabia have long recognised the extreme fragmentation of the industry, where it comprises a variety of contractors, many of whom are small, unspecialised, undercapitalised, and financially unstable. Also, he points out that in most construction projects, the use of sub-contractors has become a common practice; where specialised firms perform the majority of the work.

As for the performance of the construction industry, Falqi (2004) in his research on construction projects delay factors in both Saudi Arabia and the United Kingdom, stated that the results of his research indicate that the average ratio of actual completion time of construction projects when compared to the planned contract duration in both the Saudi construction industry and the UK construction industry fluctuates between 110% and 130%.

Moreover, Falqi (2004) showed that extensive delays in Saudi Arabian construction industry projects are considerably longer than in the UK; as 21% of respondents from SA experienced an average delay that ranged between 131% to over 200%. Thus, the Saudi Ministry of Economic and Planning (MEB) encourages small-to medium-size construction organisation to seek knowledge and experience and to adopt new tools and techniques in order to overcome obstacles such as uniqueness, complexity, size and technology which surrounding the construction industry (MEB, 2008).

The extensive delay and overrun budget of Saudi construction projects requires a great deal of attention towards the effectiveness of methods and techniques used by Saudi organisations to implement their projects. This leads to the research questions as: “Are the methods, tools, and techniques of project management applied by Saudi contractor organisations for their projects adequate in order to achieve success?” This question

requires assessing the Saudi contractor organisations PM maturity level, as well as to identify what will lead to organisations success and what strategic issues factors need to be considered.

This paper aspires to provide solutions that can be recorded and developed; in order to tackle such a situation in the construction industry, and to encourage Saudi firms to apply Project Management approach as a way-of-working rather than just using some of its tools and techniques.

### **The effectiveness of Project Management tools and techniques**

Many businesses are recognizing the power of a project-based approach, and are implementing PM as a core competence. The value of a formal and structured approach to PM is becoming increasingly recognized as the discipline develops and more organizations begin to reap the benefits of proactive project-based management. The successful business will be the one that manages its projects most effectively, maximizing competitive benefits while minimizing the inevitable uncertainty. Guidelines and standards define best practice of PM (for example, PMBOK 2000, APM-BoK 2000, BS6079-1: 2000), and there are a number of sources of help available to organizations wishing to develop or improve in-house PM processes.

The reason for the orientation of much of the business world to adopt ‘projectification’ or PM orientation thought relies on set of PM methods that are capable of restructuring management and adapting special management techniques; in order to achieve the best possible control and use of existing sources (Williams, 1999).

### **Definition of Project Management (PM)**

In order to define PM the concept of project would be better to be defined first. According to Burke (2003, p. 2), the Project Management Body Of Knowledge (PMBOK) defines a project as: “...a temporary endeavour undertaken to create a unique product or service. Temporary means that every project has a definite end. Unique means that the product or service is different in some distinguishing way from all similar products or services”.

In addition, Murphy and Ledwith (2007, p. 155) describe the project as: “the achievement of a specific objective and involves the utilisation of resources on a series of activities or tasks”. Moreover, Webster (1994), Loo (1996) and Burke (2003) go further and describe the project features to include:

- Example of bullet points
- Definite start and finish dates;
- A life-cycle, where a number of distinct phases are in between a beginning and an end;
- A definite budget allocated with an associated cash-flow;
- Unique and non-repetitive activities;
- The use of human and nonhuman resources (i.e., people, money, materials and equipments);
- A single point of responsibility (i.e., the project manager);
- Fast tracking, in which to get your product or service into market before other competitors; and
- Team building process, which includes roles and relationships require to be developed, defined, established, and in subject to be changed.

As for PM definition, the PMBOK defines it as: “...the application of knowledge, skills, tools and techniques to project activities in order to meet stakeholder’s needs and expectations from a project” (Burke, 2003, p. 3). Another definition of PM introduced by British Standard (BS6079) defines it as: “planning, monitoring, and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to the specified cost, quality and performance” (BS6079, 1996 cited in Van Der Merwe, 2002, p. 409).

To distinguish between these two definitions mentioned above, although they both focus on achieving success of the project, the first definition focuses on applying PM tools and techniques, which will lead to stakeholders’ satisfaction, while the second definition lays a strong emphasis on the people involved in the project and the link between their motivation and the project success (Van Der Merwe, 2002).

This emphasis on the project success has been distinguished by Cooke-Davies (2002) in order to clarify the difference between project success and PM success as follows: Project success is generally measured against the overall objectives of the project, while success of PM is measured against the widespread and traditional measures, which are known as the ‘Iron Triangular’, time, cost and quality. Further, Munns and Bjeirmi (1996) concluded that in spite of the difference between project success and PM success they

complement each other. This could be obvious as a project can succeed despite the failure of implementing PM tools and techniques, however, successful implementation of PM tools and techniques will increase the potential for success on an overall project scale.

### **Benefits of Project Management**

The wide spread use of PM has come from the significant advantages that PM tools and techniques could offer, as well as from the characteristics of such an approach of management. PM initially proceeded relatively slowly until it gained wider acceptance in the 1990s and the 2000s. This acceptance is owing to the desire of organisations to be developed, successful, and also, to gain the capability to compete with their competitors in the global market (Burke, 2003).

Also, PM offers a harmonious system through which to plan, monitor, and execute projects, covering all of the details required to be known in order to insure the project success. Many authors have expressed the benefits of using PM approach and its ability to address the project and/or organisation's needs and requirements to be achieved successfully. The most important benefits of using PM tools and techniques have been gathered and recognised from the points of view of the following respected authors in the field of PM to be as:

#### *Single point of responsibility*

The project manager is responsible for the complete project. It is the project manager's main function to insure the safe delivery of a project within time, cost, and quality. His tasks include planning the project activities, organising and staffing the best method to procure a project, as well as controlling the work needed to be done, and monitoring the percentage of work completed (Atkinson, 1999; Kerzner, 2006).

#### *Client*

As the PM approach encourages a single point of responsibility technique, who is usually the project manager, the client and other stakeholders prefer to deal with one person in

order to be confident that issues will be addressed and the project will be achieved on time (Atkinson, 1999; Eve, 2007).

#### *Estimation techniques*

One of the most crucial benefits of PM approach is the ability to estimate time of activities and tasks based on concrete information. This makes the plans easier to form and then to be managed (Smith, 2002; Burke, 2003).

#### *Fast track*

PM helps organisations to bring a new product or services to the market quicker than other competitors (Van Der Merwe, 2002; Dixon *et al.*, 2005).

#### *CPM*

The critical path method provides project managers with a professional technique to plan projects' activities, reflecting the sequence of activities and the required duration for each activity, as well as reflecting the critical activities that could affect and delay the overall project time (Harris and McCaffer, 1995; Smith, 2002).

#### *Reporting systems*

There are many kinds of reporting systems that PM approach adopts, and develops in order to support the frequency of the work whether it is for the strategic level or for projects and/or practical levels, such as Programme Status Report (PSR), Cost account Variance Analysis Report (CAVAR), Quality Status Report (QSR), and Safety Status Report (SSR) (Metaxiotis *et al.*, 2005).

#### *Schedule barchart*



It is one of the most widely used planning and control documents for communicating schedule information in order to help project managers to address the what, when, where and who (Burke, 2003).

#### *Project integration*

It integrates the three main PM process of planning, execution, and control; this helps to co-ordinate and integrates the contribution of all of the project's participants (Smith, 2002; Kerzner, 2006).

#### *Response time*

PM approach encourages feedbacks reports for the planning and control system in advance in order to address the project needs earlier, as well as to support the project performance (Metaxiotis *et al.*, 2005).

#### *Procedures*

Planning and control system enables project managers to develop work structures and procedures to manage their projects, which are customised to the specific needs of the project (Kerzner, 2006; Eve, 2007).

#### *Trends*

PM offers project managers with the Iron Triangle trend (Time, Cost, and Quality) to best monitor the project progress and performance (Shenhar and Wideman, 2002; Burke, 2003; Ojiako *et al.*, 2008).

#### *Project office*

This offers the organisation with a centre for project management excellence, and it can be considered as the organisations department for a continuous development in PM tools and techniques (Burke, 2003).

### *Closeout report*

It is one of the core benefits of PM approach; this is because closeout report provides an effective mechanism for the organisation to learn from its mistakes on the current projects, and it will be a database for estimating for future projects (Burke, 2003).

### *Marketing*

Effective PM is one of the tools that vendors' can use to distinguish themselves when marketing to their product or services (Burke, 2003; Kerzner, 2006).

These benefits and more could be considered as the key reasons for the widespread use of PM. What is more is that PM is continually developing itself and its tools and techniques to be more effective and efficient to be adopted by organisations and individuals in the dynamic environment that surrounds the construction industry.

### **Introducing the Project Management Maturity Model (ProMMM)**

Hillson (2003, p. 299) points out that for a project based organisation; it should assess its project management capability, and explains that “in order for an organisation to be able to determine whether its project management processes are adequate, agreed measures are required to enable it to compare its management of projects with best practice or against its competitors”.

For this reason, Hillson (2003, p. 300) clarified that Project Management Maturity Module (ProMMM) “has been developed to meet the needs of organisations for a maturity-model framework capable of acting as a capability benchmark”. The ProMMM consists of four levels of increasing PM capability that are described as follow: Naive, Novice, Normalised and Natural. The aim of ProMMM is to provide a structured direction to ‘excellence in project management’, with defined stages enabling organisations to benchmark themselves. The four levels of ProMMM can be described as follows:

### **ProMMM Level 1**

The 'Naïve' level is the level to which an organisation is 'unaware' of the value of using projects to deliver business benefits, and has no structured PM approach. Also, in this level the management processes are 'repetitive and reactive', and are usually combined with 'little' or 'no attempt' to learn from the projects history or to 'prepare for future threats or uncertainties'.

### **ProMMM Level 2**

The 'Novice' level is the level to which an organisation has 'begun' to experiment with PM approach, possibly through a 'small' number of individuals, but has 'no formal' or 'structured generic processes' identified. Even though that awareness of the potential benefits of a structured approach to managing projects is available, the 'Novice' organisation has not effectively implemented PM processes, and full benefits of PM have not been gained yet.

### **ProMMM Level 3**

The 'Normalised' level is the level to which most organisations 'aspire' when setting targets for the management of projects; the main concepts of PM are 'captured' in this level. At this level, PM approach is implemented across all aspects of the business and generic PM processes are formalised and widespread between departments and employees. And the benefits of the PM approach are fully understood at all levels of the organisation, although they might not be fully achieved in all cases.

### **ProMMM Level 4**

Many organisations would be happy to remain at Level 3, but ProMMM defines a further level of maturity in PM capability, known as the 'Natural' level for an organisation. In this level the organisation has a 'fully project-based culture', with a 'best-practice' approach to PM in all aspects of the business. Also, project-based information is actively used to improve business processes and to gain competitive advantages.

## **Methodology**

This study was designed to an academic structure in order to address the problem recognised above. Thus, it was decided to carry out two stages of study. The first is a comprehensive review of the relevant literature about this subject, starting with an overview of the effectiveness of PM as a concept, and then highlighting the significant aspects related to PM profession, and issues of strategic factors that could affect success of organisations' projects.

Further, the second stage was to design a quantitative questionnaire capable of benchmarking organisations capability to implement PM effectively and highlighting the strategic issues factors that prevent them from doing so; in order to be distributed in the Saudi construction industry. The research adopted the 'random sample technique' as the best method to deliver the questionnaire targets. Thus, the main survey questionnaire 'randomly' traced small to medium private contracting organisations in the Saudi construction industry and 180 questionnaires were sent to these Saudi private contracting organisations. A total of 38 useable responses for the questionnaires were received, which results in 21.111% as a response rate.

## **Results**

The second section in the main survey questionnaire is PM level in your organisation. This section introduced the project management maturity module (ProMMM), which has been designed for one question only asking respondents to assess their organisation's project management maturity level with the description of the four levels of ProMMM as an answer, so that one level only can be chosen as an answer for this section.

For the first level (Naïve) of PM maturity module there were 13 respondents considered their organisations to be in this level, and 11 respondents who considered their organisations to be in the second level (Novice), which means that more than half of the respondents who considered their organisation to be in preliminary levels of applying project management approach and its tools and techniques properly. On the other hand, 10 respondents considered their organisations to be in the third level (Normalised) and looking forward to making more advantages of project management approach, whereas

only 4 respondents considered their organisations to be professional in project management approach and they have chosen the fourth level (Natural) of PM maturity levels.

The results show that more than half of the Saudi contractor organisations (63.1%) are between level one or two of the ProMMM scale; which means that the majority of the construction organisations have no or very limited awareness of Project Management profession and its tools and techniques.

The last section in the main survey questionnaire is Factors could affect projects' success. This section introduced 17 factors related to what has been collected from the literature of PM strategic issues factors, in order to ascertain from the respondents, considering their organisations, and the frequency of the factors existence in their organisations and in the Saudi construction industry as a whole.

Correlations analysis were then conducted between organisations have no or limited awareness of project management approach with the ranked factors; to extract the highest five ranked/chosen strategic issues factors that affect the success of those organisations' performance and projects. These existed factors are as follows:

1. Applying Risk Management processes prior to the commitment of the project;
2. Applying a PM benchmark system to assess the organisation's PM and to measure the success of its projects, as well as the level of the organisation's performance compared with similar organisations;
3. The existing culture and policy of the organisation provides an adequate support for the exchange of knowledge between different parts of the organisation (skills, experience, and knowledge);
4. Attention is being paid by the management towards team building processes for the organisation projects; and
5. Support and involvement of the top management in terms of clearly communicating the benefits and values of applying PM tools and techniques.

## Conclusions

To sum up, project-based-organisations in order to achieve success of their performance and projects and in order to overcome their competitors in the dynamic and complex construction industry are required to apply a PM benchmark system and to implement PM tools and techniques effectively and efficiently. The concluded strategic issues factors, if considered, are crucial factors that help organisations to achieve projects' success, and also, organisations' success and vice versa.

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# International Construction Projects in Saudi Arabia: Risk Management Practical Factors for Public Private Partnership Projects



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## Background

A major factor affecting the practical performance of contractor organisations is careful project selection. The project selection decision is arguably the most critical business decision facing contractors. Bidding for inappropriate projects may result either in large losses or in wastage of time and other resources that could have been invested in more profitable projects. High complexity of process is a major characteristic of bidding decision, which impinges on a large number of objectives and reflects on several internal and external factors. Risk is at work where rational decision making is supported by incomplete information; hence the possible negative consequences of such a decision may emerge.

## Purpose & Aim

As a part of the PhD research entitled: International Contractors' Decision to Invest: The Strategic Risk Management Decision Model for Public Private Partnership Projects, strategic factors that could affect the bid/no bid decision are declared based on both practical and literature review standpoints. Consequently, these factors will be used to design the desired decision model. This poster presents the findings of one of the data collection stages conducted to collect practical factors that could enhance the successful project selection.

## Qualitative Methods

- Semi-structured one-on-one interviews conducted in person by a single interviewer
- Purposive sampling using snowball method to obtain a diverse range of experience from different types of management levels
- On-going inductive analysis of interview data to guide sampling and data collection

## Respondents

- The interviews were conducted with respondents from both public and private sectors
- These interviews were conducted with both local and international construction experts
- The interviews were conducted with 12 participants as follows: 4 Decision makers, 4 Financial Managers, and 4 Project Managers

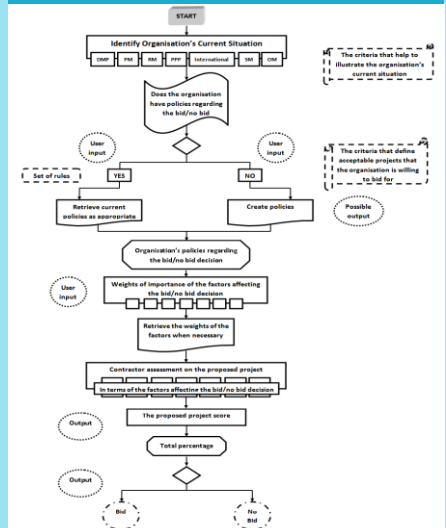
## Results & Discussion

To test the efficiency of the model-input factors that were collected from the literature and to investigate any additional potential factors that should be considered from a practical perspective; participants were asked questions aim to identify strategic risk factors that considered to be important in making their decision to bid and/or accept a bid of a construction project influenced by public private partnership scheme and international investment.

The strategic risk factors gathered from these interviews shed the light on the careful project selection and on the significant aspects that could cause project successful and/or failure. These factors are as follow:

- The stability of the country and therefore the ability to get fully paid on time;
- The link between the forecast economic growth of nations and construction activities;
- The perceived levels of competition;
- Political stability;
- Government bureaucracy;
- Government policies towards foreign trade and investment;
- Legislation;
- Government restrictions and embargos on foreign companies in order to protect the domestic market;
- Corruption;
- Delays in approvals and permits;
- War, coup d'etat, disturbances or terrorist attacks;
- Labour and immigration restrictions;
- Manpower and resources;
- Expropriation of foreign assets;
- Social and demographic factors;
- Cultural matters, particularly in relation to the courting of potential clients;
- Pre-qualification and tendering procedures;
- Business set up and company registration matters;
- The characteristics of the legal system;
- Political and social considerations;
- Financial management;
- Inflation;
- Exchange rate fluctuation;
- Taxes and duties;
- Repatriation of capital;
- Ability of Client to pay on time;
- Environmental matters;
- Joint Ventures, Consortia and Alliances With Local Partners;
- Weak and disorganised planning and co-ordination during the strategic phase of projects, leading to delayed and mismanaged commencement on site;
- Unclear division of work between the partners;
- Heterogeneous aims and objectives leading to conflicts and divergence of focus;
- Acceptance of the appointed project leader and his authority;
- Ill-defined organisation structure and decentralised leadership leading to a lack of clear decision making;
- Different approaches amongst the partners to interfaces with the client, leading to internal resentment and disputes;
- Cultural differences between partners, leading to lack of communication and unclear understanding of each other's aims and objectives; and
- Lack of trust and co-operation.

## Initial Model



## Next steps

Next steps include the following:

- ❖ Questionnaire survey: to be conducted quantitatively in order to investigate the level of importance of the literature factors affecting the investment decision, and then ranking them according to their importance to contractor organisations.
- ❖ Qualitative interviews to be conducted qualitatively and including the following tasks:
  - Identifying the current processes of decision making practice in contractor organisations;
  - Investigating the link between organisations' RM practice and decision making processes;
  - Studying performance to determine the priority levels;
  - Confirming the results of the questionnaire survey; and
  - Validating the initial concept of the investment decision model.
- ❖ Building the computerised-based model which will be conducted after the analysis of the previous phase and then will be examined with validity responses for the following reasons:
  - Examining the model's effectiveness;
  - Validating the model's concept; and
  - Gathering participants' opinions and feedback.

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