The Influence of Risks on the Success of the Development and Installation of Temporary Structure in Event Projects in Dubai

تأثير المخاطر على نجاح تطوير وتركيب الهيكل المؤقت في مشاريع الفعاليات في دبي

by

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ABSTRACT

The number of events in Dubai is getting increased and the temporary structures have been widely used as a mandatory element to support the event's venue whether to expand the capability of the venue or to create the ambience for the event.

Purpose – This study aims to recognize the risks arising throughout the project life cycle of temporary structure and seeking the influence of risks on the success of temporary structure in the event projects.

Design/methodology/approach – The basic research knowledge was carried out through a comprehensive literature review which supported to identify the risks throughout the project life cycle including the success criteria for the temporary structure in event projects. Then the quantitative research method was done for collecting data and determining the risk significance.

Findings – The study has summarized the project life cycle of temporary structure into four phases and categorized potential risks according to the project phase: 10 risks during Pre Erection 11 risks during Erection phase, 8 risks during Event phase and 8 risks during Demolition phase. Three aspects of success criteria for the temporary structure project are cost, time and safety. Research finding shows that risks arise during Erection phase are likely to be crucial as risks present the most significant influence on the success of temporary structure project, followed by risks during Pre-Erection phase. Event risks and Demolition risks present less significant influence on the project success.

Limitations – The data for this study was collected from only three organizations involved in the temporary structure in event projects in Dubai. The study findings have provided basic knowledge to manage the risks in the temporary project but cannot be implied to every temporary structure projects which is suggested to expand the sampling size and cover the client's opinion.

Keywords: Temporary Structure, Temporary Structure in Event, Whole Life Risk Management, Risk Identification, Pre-Erection Risk, Erection Risk, Event Risk, Demolition Risk

الخلاصة

ويزداد عدد الفعاليات في دبي، وقد استخدمت الهياكل المؤقتة على نطاق واسع كعنصر إلزامي لدعم مكان الحدث سواء لتوسيع قدرة المكان أو خلق أجواء الحدث.

الغرض - تهدف هذه الدراسة إلى التعرف على المخاطر الناشئة خلال دورة حياة المشروع للهيكل المؤقت والبحث عن تأثير المخاطر على نجاح الهيكل المؤقت في حالة المشاريع.

التصميم / المنهجية / النهج - تم إجراء المعرفة البحثية الأساسية من خلال مراجعة الأدبيات الشاملة التي دعمت لتحديد المخاطر طوال دورة حياة المشروع بما في ذلك معايير النجاح للهيكل المؤقت في المشاريع الحدث. ثم تم استخدام طريقة البحث الكمي لجمع البيانات وتحديد أهمية المخاطرة.

النتائج - لقد لخصت الدراسة دورة حياة المشروع للهيكل المؤقت إلى أربع مراحل وتصنيف المخاطر المحتملة وفقا لمرحلة المشروع: 10 مخاطر أثناء مرحلة التشييد المسبق 11 مخاطر أثناء مرحلة الانشاءات و 8 مخاطر خلال مرحلة الحدث و 8 مخاطر خلال مرحلة الهدم. ثلاثة جوانب من معايير النجاح لمشروع الهيكل المؤقت هي التكلفة والوقت والسلامة. وتبين نتائج البحث أن المخاطر التي تنشأ خلال مرحلة الانتصاب من المحتمل أن تكون حاسمة لأن المخاطر تمثل التأثير الأكبر على نجاح مشروع الهيكل المؤقت، تليها المخاطر خلال مرحلة ما قبل التشييد. مخاطر الحدث ومخاطر الهدم تمثل تأثيرا أقل أهمية على نجاح المشروع.

القيود - تم جمع بيانات هذه الدراسة من ثلاث منظمات فقط تشارك في الهيكل المؤقت في مشاريع الحدث في دبي. وقد وفرت نتائج الدراسة المعرفة الأساسية لإدارة المخاطر في المشروع المؤقت ولكن لا يمكن أن تكون ضمنية لكل مشاريع الهيكل المؤقت الذي يقترح توسيع حجم أخذ العينات وتغطية رأي العميل.

الكلمات الرئيسية: الهيكل المؤقت، الهيكل المؤقت في الحدث، إدارة مخاطر الحياة الكاملة، تحديد المخاطر، مخاطر ما قبل التشييد، مخاطر الانتصاب، مخاطر الأحداث، مخاطر الهدم

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LIST OF ABBREVIATION

AED	Emirati Dirham, the currency of the United Arab Emirates
CDM	Construction Design and Management Regulations
SPSS	Statistical Package for the Social Sciences
RII	Relative Importance Index

1 CHAPTER ONE: INTRODUCTION

1.1 Research Background

With 15.27 million international visitors in 2016 sent Dubai to be at the forth rank of the most visited destination in the world (Mastercard Global Destination Cities Index 2016). A large amount of that figure is claimed to be related to the events where Dubai has become a recognized host of a wide range of events since Dubai can offer all types of venues, comprehensive facilities and convenient communication (Rahman 2017).

Dubai's event sector has played as an important contributor to the Emirate's economics and GDP growth (UAE interact 2017). Every year, Dubai holds various events including sports, concerts, corporate events, art and cultural events. This sector has grown rapidly and become a core pillar of the Dubai's tourism plan to support its strong growth particularly when Dubai is named to be the upcoming host for the EXPO 2020.

The temporary structure is one of the fundamental necessities of these event projects to enhance the event venue and existing spaces by helping to transform, accommodate and set the ambience of a venue. The successful development and installation of these temporary structures can be crucial to the event's success. In order to ensure the effective integration and successful delivery of temporary structure for event projects, it is important to take into consideration at an early stage by planning and identifying all risks throughout the project life cycle of this temporary structure since before the installation till shut down.

1.2 Research Problem

There have been several studies on risk management in the construction projects in Dubai, however there is no one attempting to particularly explore in the construction of temporary structure in event projects. This study aims to identify the risks that may involve and have influence on the successful delivery of these temporary structures in event projects.

1.3 Research Aim and Objectives

This research mainly aims to identify risks throughout the project life cycle of the temporary structure within event projects in Dubai. Other objectives for the research are to;

1. Summarize the project life cycle of temporary structure in events and the criteria for its successful delivery through literature review
2. Identify and rank the significance of risks associated with in the life cycle of temporary structure in event projects
3. Identify the influence of risk on project success

1.4 Scope of Research

This research will focus on to identify the risks involved in the development and installation process of temporary structure in event projects. Qualitative research method will be used in this study in order to explore and gather the information related to general risks in relevant projects from previous studies by reviewing the literature through published papers, books, and journals. Quantitative research method will be also used in this study in a form of an online questionnaire through purposive random samplings and also face-to-face survey with who are engaged in the process of developing and installing temporary structure in event projects.

1.5 Research Questions

Eventually the research will identify the common risks and influence related to the development and installation process of temporary structure in event projects.

1.6 Dissertation Structure

The dissertation structure comprises of six chapters as described below,

Chapter One: Introduction

This chapter provides the background of the project, research problem, aims and objectives. Clarifying the scope of study and research questions.

Chapter Two: Literature Review

This chapter reviews the literature related to the temporary structure project in event including its definition, types and project life cycle, then following by the review of whole life cycle risk management related specifically to the risk in temporary structure project for event. The conclusion of this literature review forms the conceptual framework and the development of research methodology.

Chapter Three: Research Methodology and Research Framework

This chapter explains the methodology flow. Describing the design for a questionnaire used in this study, research population and sampling method and data collection method including the method how to how to analyse the collected data.

Chapter Four: Data Analysis, Findings and Discussion

This chapter reports on the findings of the study and the data analysis obtained by the questionnaires. Discussing the validation of the methodology and findings

Chapter Five: Conclusion and Recommendations

The last chapter provides a summary of the key findings of this study as well as recommendations for further research.

2 CHAPTER TWO: LITERATURE REVIEW

2.1 Temporary Structure in Event Projects

2.1.1 Temporary Structure Definition

There are several planner dictionaries providing the definition of temporary structure. In summary, temporary structure is usually referred to a structure without a permanent foundation or footing which will be removed after a period of time. These temporary structures that could be set and put up temporarily in places for different activities and purposes are broadly used to carry out a number of functions in public and private events and exhibitions for example stadium, temporal stands, business stand terraces, tourist zones, prize ceremony podiums, stadium, and grandstands (The Institution of Structural Engineers 2007). It also includes stages, short-term balcony, podium structures, marquees, shelters, shades, barriers, huts, other expandable erections like elastic castles, demountable shops or stalls and distinct platform construction like towers and ramps. Normally, temporary structure has a specified period to be used not exceeding 30 days. But this as well depends on the event or function for which it was mounted. Some temporary structures are defined as temporary demountable structures which are setup and dismantled physically several times (The Institution of Structural Engineers 2007). These structures are mostly lightweight and designed to be easy for erection and derig. They are commonly setup and erected of industrial materials that range from aluminium framework towers or trustees (Soane & Cutlack 2017).

2.1.2 Temporary Structure in Event Projects

Events and exhibitions for businesses and other functions in Dubai markets are getting a higher demand every day (UAE interact 2017). Therefore, event organisers, corporates and international firms are continuously searching for new and unexploited sites which escalate the plea for adaptable temporary structures. According to The Institution of Structural Engineers (2007) comparing the increasing demand of temporary structures over permanent structures mentioned that the demand is undoubtedly attributed to a number of factors. First, when permanent structures lack in opportunities, temporary structures offer with practically boundless possibilities. Second, temporary structures are easily customizable; they have ability to become an attractive instrument promoting themselves. Dome temporary structures, for instance, are exceptional substitutes to usual marquees and other temporary structures. In addition, dome temporary structures are appealing with their shapes besides their remarkably appropriate for every kind of event and exhibition. They have completely customizable shields which makes it likely to make full colour designs of whichever size for PVC membrane of the dome (The Institution of Structural Engineers 1999). However using temporary structures instead of permanent structures does not effect on the overall safety requirements as it always involved with a crowd and enclosed spaces which can result to evacuating plan. It is crucial that a clear requirement needs to be identified appropriately at the planning and controlling stage.

Furthermore, temporary structures are adaptable to the events and exhibitions (The Institution of Structural Engineers 2007). The flexibility of temporary structures means they can be turned into realities by having events moved to a desert or a region with patchy terrain. Moreover, temporary structures similarly provide opportunities to adjust the size to the clients, selecting a venue based on a location that will be appropriate for a given event or exhibition. (Soane & Cutlack 2017).

2.1.3 Project Life Cycle and Phases of Temporary Structure in Event Projects

Project life cycle is a step approach towards project development which has its start and finish (Gajewska & Ropel 2011). Project life cycle offers an outline for undertaking and handling any kind of project in a given organization. The Project life cycle is a typical process through where team members attain project goals. According to Gajewska and Ropel (2015), following a project life cycle is important in any project management and development as it will also improve the performance of project. The understanding of existing professional services life cycle is little since the typical project life cycle never accommodates certain projects. The standard project life cycle works for some project managers, but the phases of project life cycle can vary between the industries then professional services need a more robust process (Smith et al. 2006). The most common used and acceptable life cycle framework for project manager containing four phases is supported by several researchers such as Pinto and Prescott (1988), Ward and Chapman (1995) and Westland (2006) comprises of the following stages;

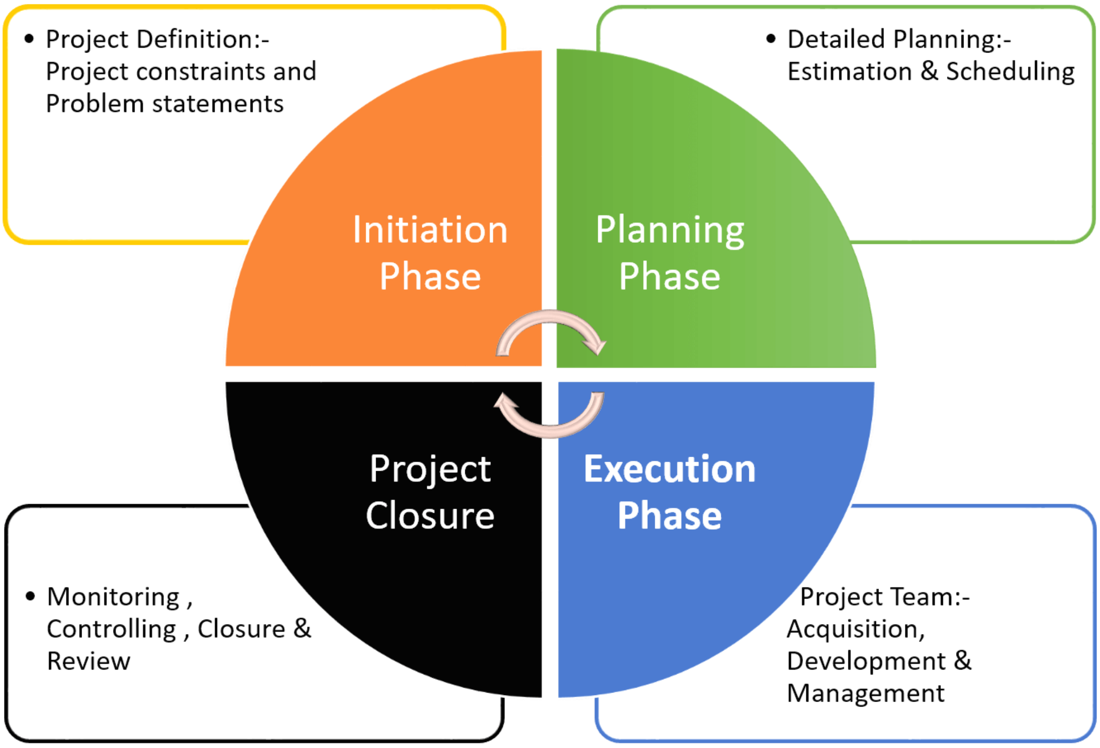

Figure 2.1.3-1: Project management life cycle (Westland 2006)

The first phase is **initiation** where the project overview is given in addition to the approaches that the project manager is planning to use so that the desired objectives can be achieved. During this initiation stage the organisation will appoint a project manager who will then choose the needed project members (Westland 2006). The second stage is **planning**, organizing and preparing where a detailed analysis is done and every task is assigned in the project from beginning to the end. The planning stage will as well draw a risk valuation in addition to describing the principles required for the effective conclusion of every task. Finally, in this stage the working process is described, stakeholders known, reporting frequency and channels clarified. The third phase is the **execution** where the planned solutions are executed to deal with the problems stated in the project specifications. Finally, we have the last step is **closure** where the project manager should tweak the small issues to make sure that the project is led to the correct conclusion (Westland 2006). This stage phase is characteristically underlined by a written prescribed project assessment report that has a number of items such as an official approval of the concluded design by the customer, a tie between the initial specification requirements stated by the organisation or customer against the concluded design, lessons acquired, project assets, and a formal project conclusion report to the management of the organisation (Westland 2006).

In temporary structure in event projects, Construction Design and Management Regulations (2015) clustered the project life cycle into two main stages which are pre-erection phase which is the period during the project is getting involved with planning and designing, and erection phase which is the time when the erection starts until demolition. After all these two group can be explained into four sub-phases as illustrated below;

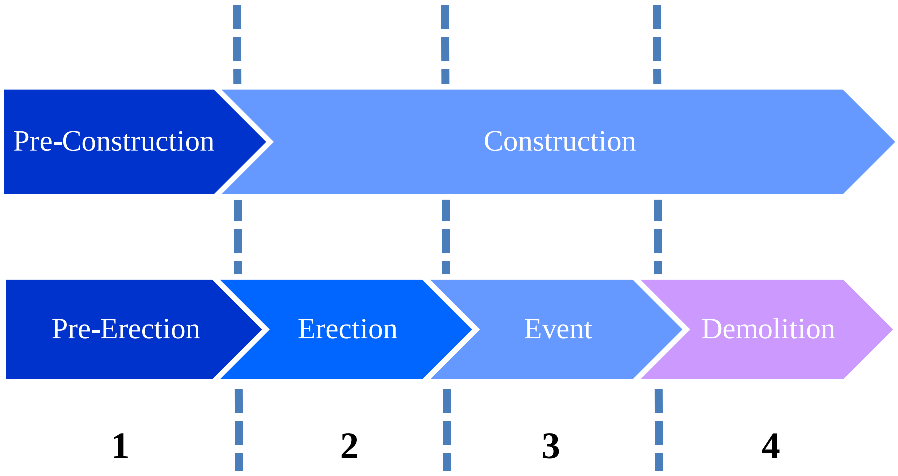

Figure 2.1.3-2: Project life cycle for temporary structure (CDM 2015)

1. Pre-Erection Phase

First, the project owners will initiate the project through management of the organisation by allocating budget to the project (The Institution of Structural Engineers 2007). Later, the project managers will be appointed to be in-charge of the project. The project managers will then choose members of the team who will assist in actualizing the project (Grosso & Thiebat 2015).

After the team is set to manage the project, planning process will start where the project manager creates plans to assist in guiding the team through the execution and closing stages of the temporary structure project. The project manager must undertake a ten step approach in the planning stage of the temporary structure development. First, the project manager must create a project plan, followed by resources plan, financial plan, quality assurance plan, risks plan, user and organisation acceptance, communications plan, procurement plan, agreements the contractors and finally conduct a review of the plans created (Soane & Cutlack 2017). The plans set by the project manager during this stage will assist to manage time, costs, value, and risks (Soane & Cutlack 2017). These plans will as well assist the project manager to handle members of the team and employ external contractors including designer and engineers to make sure that the project objectives are met, well planned and project delivered within time and budget (The Institution of Structural Engineers 2007).

2. Erection Phase

The moment a project has moved to the erection stage which is comparable to the implementation phase for temporary structure (CDM 2015), the project team members and the essential resources to conduct the project must be availed and ready to carry out project events. The project plans in addition must have been done and base line drawn before moving to erection phase. At this point, the importance of project manager will shift from project planning to observation and inspection of the work that is being done (Soane & Cutlack 2017).

This stage will allow the project manager to concentrate his attention on allowing project plans, procedures and dealing with the anticipations of clients and shareholders. The project manager will require paying specific consideration when the project in being executed to updating interested parties and other stakeholders on the project progress, dealing with procurement and contract management matters, assisting administers quality controls, and observing project risks (Mehdizadeh et al. 2013).

3. Event Phase

Third phase in temporary project is the event phase which is the period that the temporary structure will used (CDM 2015). At this phase, the project manager has a number of responsibilities including no just stopping after all the erection phase is over. Since the project manager is in-charge of stakeholders within and outside, project team members, vendors, top management amongst other interested parties, the conspicuousness of the project manager is increased. A number of these groups will anticipate seeing and deliberating the subsequent deliverables that were so exactly detailed in the planning phase, particularly on project of large magnitude and will be a significant figure when the project is being executed (The Institution of Structural Engineers 1999). During this phase the communication between project manager and event organiser is crucial as the usage of the temporary structure has to be controlled which is involved with the safety of crowd (The Institution of Structural Engineers 2007).

4. Demolition Phase

At the end of event, the temporary structure project finally moves to closure which is the last stage of the project life cycle. In this stage, the project manager will officially close the project including two main scopes which are closure on site and closure of project. At this point, the temporary structure will be dismantled and project manager will also develop an overall report on the success and failures of the project. Project closure involves dealing with the deliverables to the clients, taking the all the documentations to the organisations, terminating contractor contracts, freeing members of staff and equipment, and notifying shareholders of the conclusion of the project (Grosso & Thiebat 2015).

When the project is formally closed, a post execution assessment is done to define the project's successes and ascertain the lessons learned. The initial thing done in project closure is the designing a project closure report. This report is an important part of the project closure because it lists each activity needed to accomplished the project in the project closure report, to make sure that project closing is finalized well and professionally (Grosso & Thiebat 2015). When the project closure report is accepted by the executive management, the conclusion events listed in the project report are actioned. Within three months after closing the project and the organisation has started experiencing the advantages that the project provides, the project managers requires to write post execution assessment. This assessment permits the organisation to determine the level of achievement of the project and enumerate some lessons learned for future projects (Grosso & Thiebat 2015).

2.1.4 Successful Delivery of Temporary Structure

The criteria for successful delivery of project is a benchmark or set of values that project success is adjudicated where the project deliverables can be measured against. Previously most of studies suggest to utilise the iron triangle or golden triangle which are cost, time, and quality as benchmarks to quantify project success (Atkinson 1999). This understanding have directed project managers to simply utilise the golden triangle for measuring the successful delivery of temporary structures in event projects (The Institution of Structural Engineers 1999).

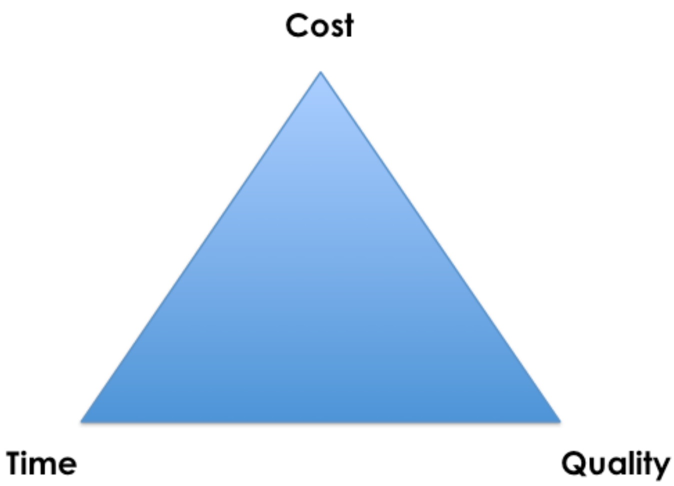

Figure 2.1.4-1: Iron triangle (Atkinson 1999)

According to Iqbal et al. (2015), the success of temporary structures in event project success can be perceived differently from person to person. This issue has been discussed in a number of literatures and it is not clear yet how temporary structures in event project can be successful. According to Fernando et al. (2017), project manager needs to apply a three-way approach to determine which elements underwrite to meet organizational objectives. The association amongst these parameters is such that if one of them changes, it will affect the other. According to Mehdizadeh et al. (2013), temporary structures' project success depends on how well the project manager measures against the general goals of temporary structure in event while the project management success will be measured on the project performance against cost, time and quality.

Cost

The temporary structures event project is the budgeted amount. It focuses on defining the cost of the project events and forming the cost model. The temporary structures event project cost model is a record of planned costs for temporary structures event project (Iqbal et al. 2015). Moreover, the cost of the project needs to be within the time the temporary structures event project in going to be done. This is the budgeted amount existing for the temporary structures event project (Deodatis et al. 2014).

Time

According to Deodatis et al. (2014), in temporary structures event projects, time limitation is a challenge especially during the pre-erection and erection phase. This is the period between temporary structures event project initiation and before the event starts. The time benchmark is temporary structures event project timetable. A temporary structures event project timetable captures the strategic dates for events and indicators. The time set for the temporary structures in event project construction must be within the budgeted cost and the time that project will take (Ismail & Ghani 2012).

Quality

The quality criteria will concentrate on the performance and outcomes of temporary structures in event project. This is the discipline that makes sure that processes and objectives of the project meet the users and executive management desires. According to The Institution of Structural Engineers (2007), the quality of temporary structures in event projects is very important especially the quality in terms of safety as the temporary structure which usually has a lightweight structure standing without permanent foundation may get involved with overloaded crowd or uncontrollable environment such as strong wind. The quality of the temporary structure must be in high standard.

An overall narrative success factor of temporary structures in event project is described as personal features that are essential to do the work, such as awareness, assertiveness and skills. This means that the influence which underwrite to the outcome may elect as the temporary structures' project success factors and success criteria is one group of situations essential to arrive at a decision of temporary structures' project success (Zavadskas et al. 2010).

In some cases, although a temporary structure project is seen to be successful and success benchmarks of the temporary structures event project were all achieved. Therefore, the golden triangle (cost, time, quality) never considers how well the temporary structures event project is applied by the customer, whether it was adored by organisation or if it enhanced efficiency or efficacy for the company.

2.2 Whole Life Cycle Risk Management for Temporary Structure in Events Projects

Risks are persistent elements in our daily life. Generally, risk is linked to the unidentified result of future actions and to the view that these results might not be good. According to Lyons & Skitmore (2004), risk management generally involves a procedure in which the dangers of a predetermined task are measured and demonstrated. As per Cohen & Palmer (2004), risk management is the procedure connected to direct the likelihood of specific events which can influence the project's goals, cost, time, quality, and scope (Cohen & Palmer 2004). The fundamental ideas of risk management is to incorporate risk, certainty, uncertainty, exposure, and risk acceptability (Jeljeli 1995). To control these risks; to minimize possibly adverse problems risks anchored concerns need to be incorporated to a diagnostic risks controlling structure, which involves an iterative and multi-disciplinary procedure, which includes every stakeholder. Risk management procedure must be put in place to make sure that any risk is well management before affecting the project outcome (Mehdizadeh et al. 2013).

In temporary structure in event projects, risk management is a methodical practice of handling risks, reinforced by the data collected in risks analysis. It creates a suitable basis; arrays objectives and intents; notifies risk anchored decision making; monitors and evaluates risk rejoinders; and pinpoints, chooses, and executes suitable activities to alleviate or regulate risks (Lavagna et al. 2014).

According to Lyons & Skitmore (2004), the final goal of any risk management implementation is to detect, alleviate, lessen, and, if conceivable, eradicate risks. To enhance the likelihood of an effective temporary structure in events projects, risk management needs not to be seen as an option, but it needs to be at all times taken care of. This allows the project manager to act after deliberation of the risks, and alleviation processes may be done in a non-stressful environment prior to the real active phase. Furthermore, it is likely to recognize the possible consequences of accepting the risks.

2.2.1 Whole Life Cycle Risk Management

The Whole Life Cycle Risk Management is largely relevant to a great variety of environmental matters and concerns. Even though the methodology was designed for risk management in long term projects, Whole Life Cycle Risk Management is suitable and appropriate when evaluating and dealing with environmental risks (Zavadskas et al. 2010). The Whole Life Cycle Risk Management was designed for a project that characteristically need to sustain certain level of financial practicality which are active, continually changing all through time (Boussabaine & Kirkham 2008). The Whole Life Cycle Risk Management deals with these dynamic qualities, and it includes a continuous re-assessment of the risks and their concerns, all through the whole life cycle of projects.

Soane & Cutlack (2017) identify a number of major risks that account for temporary structure in events projects interruption and graded them anchored on a questionnaire survey with construction engineers. Lavagna et al. (2014) as well suggest to authenticate the success after dealing with these risk through specific interview surveys.

Mehdizadeh et al. (2013) carried a research on temporary structure in events projects to observe the components of poor temporary structure in events projects and building safety management in China and established that the major issues that affect the safety performance including poor safety consciousness of executive administration are improper training, hesitancy to provide required resources for safety, poor safety responsiveness of project manager, and irresponsible operations. Whereas the aforementioned research conducted various studies on assorted risks that affect temporary structure in events projects’ goals in terms of costs, time, safety and quality, some studies looked into the risks or risk controlling and management in diverse stages of the temporary structure in events projects (Zavadskas et al. 2010).

Zavadskas et al. (2010) investigated different structural and cultural issues that concern the execution of risks controlling and management in the theoretical stage of the Whole Life Cycle

Risk Management and established that whereas most contractors in construction field were aware of the risk controlling and management, its use in the theoretical stage was comparatively no-existent or low; qualitative instead of being quantitative exploration approaches were mostly utilised; extensive embracing of risk controlling and management was obstructed by a low understanding and skill-base, which came from a lack of commitment to training and certified growth.

Mehdizadeh et al. (2013) conducted studies and then categorized temporary structure in events projects design risks to three clusters including erection financing, erection schedule or time and erection design. Fernando et al. (2017) tackled these risks broadly in the context of various contractual connections that exist amongst the practical objects involved in the development, improvement and building of the temporary structure in events projects.

In addition, Lavagna et al. (2014) says that classifying the risk is a vital stage in the Whole Life Cycle Risk Management, since this stage will try to configure the various risks influencing a temporary structure in events projects where will be a foundation for project manager to respond to those risks in an appropriate and effective manner, a number of methods were recommended in the literature for categorizing risks.

In the research from Ratay (2012) providing list of factors originated from several sources which were grouped in the context of risk holders which are contractor, consultant and customer. A number of methods may be applied categorize the risks connected to temporary structure in events projects and the basis for selecting the approach need to facilitate the drive of the temporary structure in events projects construction.

2.2.2 Framework for Whole Life Cycled Risk Management

According to Boussabaine & Kirkham (2008) suggest to adapt traditional steps of risk management process including risk identification; risk assessment, risk responses, risk plan and risk monitoring and feedback to be integrated within the Whole Life Cycle Risk Management framework which are summarized into five interactive steps which are all equally important as shown in diagram below;

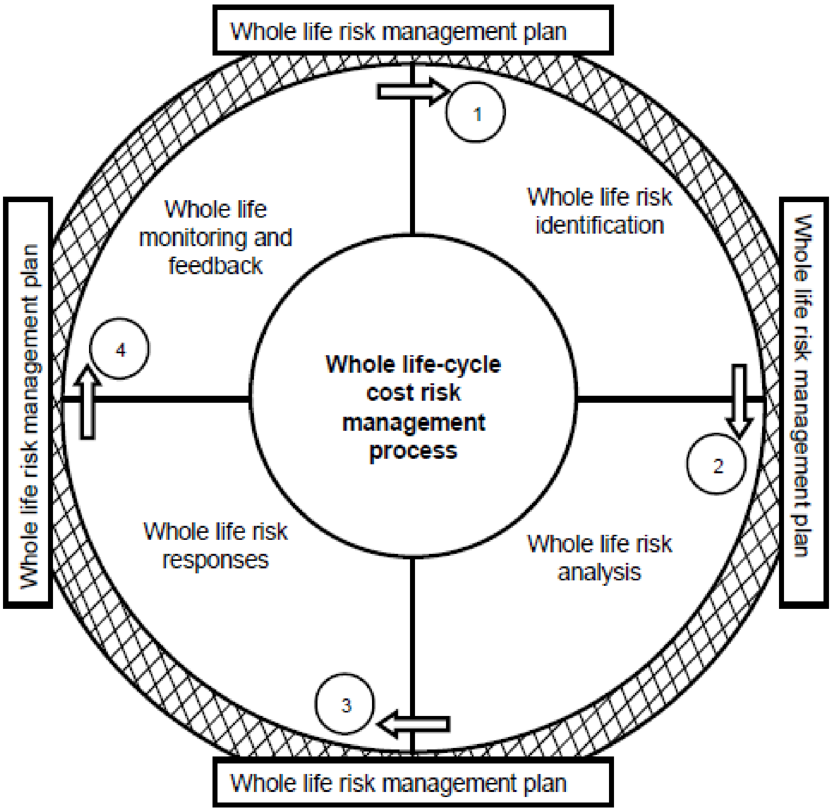

Figure 2.2.2 -1: Whole Life Cycled Risk Management Framework (Boussabaine & Kirkham 2008)

During the risk identification stage, the project manager identifies the risks that may exist during the development and installation of temporary structure in events projects. The project manager as well establishes the probabilities of occurrence for those risks. Later, project manager measures the possible effect of risks event results during the risk assessment stage and incorporates risk identification, evaluation and approximation. Then the responses for risk mitigation will be planned and applied. Finally the project manager will monitor the results (Boussabaine & Kirkham 2008).

2.2.2.1 Whole Life Risk Identification

Risk identification is a methodical procedure for identifying and authenticating every risk and where these risks are coming from. This step is accepted to be the most important process among all risk management procedure (Boussabaine & Kirkham 2008). The project manager will use a checklist of possible risks and evaluate the possibility that these activities may occur. The risk checklist can be designed upon the project manager’s past experience on temporary structure in events projects as well as professionals in construction field which can be resources for pinpointing possible risk on a temporary structure in events projects (The Institution of Structural Engineers 2007). Especially to create a check list for major temporary structure projects, referring and adopting what other construction industries are using can help the checklist to be more comprehensive (Lavagna et al. 2014). These specifications may be supportive to the project manager and members of the team in classifying both exact risks on the specification and increasing awareness of team members and the project manager. Miller (2000) suggests that most risks can be grouped into two categories which are internal and external. These categories can also be clustered into more specific groups including technical aspect, costs, time, customers, contracts, weather, finances, politics, and people.

The result of risk identification will support the next step of whole life cycle risk management which will focus on appraisal the listed risks by using quantitative technique (Boussabaine & Kirkham 2008).

2.2.2.2 Whole Life Risk Analysis

After identifying the potential risks, the project manager and other members of the team will assess the risks on the likelihood of the risk occurrence and write a report on the likely loss accompanying the activity. Risk assessment involves a logical procedure for recounting and enumerating the variables theme to risks and ambiguity (Boussabaine & Kirkham 2008). The risks analysis methods may be different depending on the circumstances (Lavagna et al. 2014). Risk assessment is based mounting an understanding of which possible risks pose the utmost dangers to projects including the likelihood of happening and the severity or the possible loss to the project.

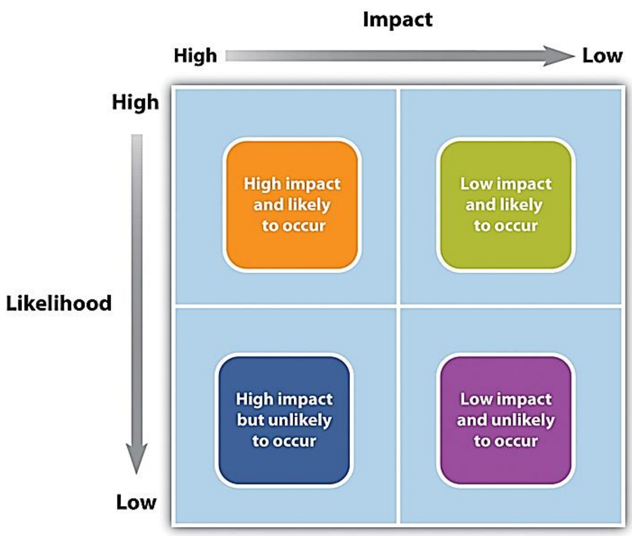

Figure 2.2.2.2-1: Risk Assessment Flow Chart

Risk matrix or Heat Map has been broadly used in risk management models as they are a viable and simple device (Cox 2008). Assessment on impact is considering the result if the risk eventuates and determining the presumable degree of those outcomes. Probability evaluations can be confined in quantitative, semi-quantitative or subjective styles. There are several aspects to rate the probability of risk event by considering chance, likelihood or frequency.

This matrix contains positioning values that might be utilized to rank dangers and openings subjectively. The likelihood scales are measures of likelihood got from rates, and the effect scales are chosen to represent the level of effect on project goals. The figures inside the network cells are computed from a specific likelihood and affect, and are dictated by increasing the likelihood by the effect.

Probability	0.9	Very high 71–90%	0.045	0.09	0.18	0.36	0.72
	0.7	High 51–70%	0.035	0.07	0.14	0.28	0.56
	0.5	Medium 31–50%	0.025	0.05	0.10	0.20	0.40
	0.3	Low 11–30%	0.015	0.03	0.06	0.12	0.24
	0.1	Very low up to 10%	0.005	0.01	0.02	0.04	0.08
			Very low	Low	Medium	High	Very high
			0.05	0.1	0.2	0.4	0.8
			Impact				

Figure 2.2.2.2-2: Risk Probability Impact Grid (Prince2 2009)

In temporary structure in events projects, we have a positive relationship between risks and its difficulty; both will increase or decrease together (Lavagna et al 2014). Temporary structure in events projects with fresh and innovative technologies will have a high complexity assessment and a compatibly great risk. The suitable resources need to be allocated to the technology directors to guarantee the achievement of temporary structure in events projects objectives. The more complex the technologies, the more resources the technology manager characteristically will require to achieve temporary structure in events projects objectives and every one of these resources can face unforeseen difficulties (Grosso & Thiebat 2015).

Risk assessment for temporary structure in events projects frequently arises in a workshop situation. Building on the detection of the risks, every risk occurrence is examined to define the probability of arising and the possible costs if it did arise. The probability and effect are both regarded as very high, high, medium, low or very low which can support to identify the risk exposure and can be used for risk classification (PMI 2006). Those levels are intolerable, unwanted, tolerable or insignificant. The risk response strategy will deal with the items that have high evaluations on risk exposure (Fernando et al. 2017).

2.2.2.3 Whole Life Risk Responses

After the project manager and members of the team have recognized and assessed risks, they develop a risk mitigation strategy, which is a strategy to decrease the effect of an unforeseen occurrence. Risks response is a vital element in the risk management process that defines which actions that the project manager and members of the team will take to deal with risks assessed in the risk analysis phase. The whole life risk response is suggested to follow the widely used response techniques which are avoidance, reduction, acceptance and transfer (Boussabaine & Kirkham 2008). Similarly, Soane & Cutlack (2017) mention that risk responses in temporary structure project are the steps that the project manager takes to eradicate, lessen or relocation a risk or its magnitude. The risk response process includes creating a plan of the mandatory actions to be used in case the risk events arises. It similarly involves taking strategic action if necessary and following-up with the concerns of these actions to make sure that the risks strategy ends up in the needed result.

Risk response is deduced by suggesting a number of substitutes to eradicate or lessen projected risks and allocate an ideal substitute as a response. According to Mehdizadeh et al. (2013), risk response is a process of detecting or designing risk response alternatives and defining events for dealing with the risks, pointing at improving prospects and decreasing any threat to the goals of temporary structure in event project. Risk response is, therefore, the assortment of a suitable strategy to cut the negative effect of risk. Therefore, it is essential to develop suitable responses to these risks after the initial phases of risk detecting, evaluation and distribution.

According to Soane & Cutlack (2017), there are different risk response methods in relation to risks in temporary structures for events projects. There are four discrete methods broadly used to respond risks which are avoiding, sharing, reducing and accepting. These responses are suggested to be adopted for managing risk in temporary structures project as well. However the selection of risk response approach and methodology should depend on the type of risks that is being dealt with (Soane & Cutlack 2017).

Risk avoidance

Flanagan and Jewell (2008) suggest that risk avoidance should be used as a response when the risks are not acceptable at all. When the potential risk has high exposure level, it shall be removed where the project manager can create an alternate plan that has an advanced likelihood of success. A collective risk avoidance practice is the application of established and prevailing technology tools instead of adopting fresh methods, even though the fresh methods might display promise of excellent performance or low expenditures. The solution to avoid the risk in this case could be making a contract with the vendor with verified track record over a fresh vendor that is offering significant cost incentives to avoid the risks of contracting a fresh vendor (Lavagna et al. 2014).

Risk sharing

The other approach that can be used is risk sharing. Risk sharing includes establishing a partnership with other firms or people to share responsibility for the risk events. A number of firms that handle international temporary structure in events projects will lessen political, legal, labour, and other risks related to international temporary structure in events project by creating a joint scheme with a firm within the same country (Zavadskas et al. 2010). Launching a partnership with another firm to share risks linked with a quota of the temporary structure in events project is beneficial when the other firm has skills and capability that the team members or organisation do not have. If the risks does not arise, then the associating firm will also share some desirable effect from activity and as well stem a few of the revenue or advantage gained by a successful temporary structure in events (Lavagna et al. 2014).

For instance, a construction multinational firm in United States was awarded a contract to construct a pipeline system in Peru. The firm setup a partnership with a building firm in Peru with a good reputation to do the construction within the set schedule. The firm in Peru hired the local professionals and the United States firm provided the logistics and modern building approaches. In case the project was not done within the scheduled time, both firms would have received less revenue, but the project was completed and both firms met profit objectives (Lavagna et al. 2014).

Risk reduction

In addition, the project manager and other members of the team can use risk reduction strategy to mitigate risks. Some risks are not crucial to be eliminated as their impacts are not significantly severe, yet they are still too enormous to hold or overlook. For this situation, the risk exposure shall be measured in order to choose between decreasing the likelihood of the occasion and lessening its possible effect (Jones & Saad 2003). On international temporary structure in events projects, firms will regularly buy the agreement of an exchange rate to lessen the risks related to instabilities in the money exchange rates (Lavagna et al. 2014). The project manager can employ a professional to assess the technical strategies or the expenditure approximation on a temporary structure in events project to upturn the confidence in that strategy and decrease the project risks. Allocating extremely experienced project manager and the members of the team to manage the high risk events is an additional risk reduction technique. Professionals handling high risk events may often forecast difficulties and get resolutions that inhibit the events from posting a negative effect on the temporary structure in events project (Lavagna et al. 2014).

Risk transfer

Moreover, project risks can be mitigated by using risk transfer approach. It is a technique that changes the risks from the project to a third party. The acquisition of insurance on some items is a risk transfer technique (Knecht 2002). The risk is reassigned from the project to insurance firm selected. For instance, temporary structure in events project in United Kingdom can buy hurricane insurance to cover the costs of a hurricane that may destroy a temporary structure project. The acquisition of insurance company is ordinarily in zones external to the control of the project manager and members of the team. Change of weather, political discontent, and industrial strikes are cases of happenings that may expressively affect the temporary structure projects and that are external to the control of the project manager and members of the team (The Institution of Structural Engineers 2007).

Additionally, the project manager and team members must design a project risk contingency plan. The project risk contingency plan will balance the investments of the extenuation against the benefits for the temporary structure project (Soane & Cutlack 2017). The substitute technique is always designed for completing project objective when a risk event has been recognized that can exasperate the achievement of that objective. These strategies are known as contingency strategies. The risks of a truck drivers' industrial strike can be alleviated with a contingency strategy that uses another transportation to move the required equipment for the temporary structure project. If a critical portion of the equipment is delayed, the effect on the timetable may be alleviated by making modifications to the timetable to house the late equipment supply (Soane & Cutlack 2017).

As a result most project managers consider that the risk response planning stage is the only important in the risk response process, because this is where the project manager and members of the team get an opportunity to make a difference to the risk response exposure that faces temporary structure events projects. It is typically the concern of every risk owner to choose what kind of risk response is most suitable, although they will regularly pursue assistance and guidance on this. When mounting temporary structure in event, project risk response is vital to embrace a strategic methodology so that the concentration is on what is being done (Lavagna et al. 2014).

Finally, the risk management is a rational procedure that handles risks on temporary structure projects. The project manager and team members are required to develop risks information system which provides an appropriate outline; sets goals and purposes; determines and examines risks; inspires risk decision making course; and monitors and evaluate risk responses. Furthermore, they are also required to detect, choose and execute appropriate activities to administer and regulate risks (Deodatis et al. 2014).

Lavagna et al. (2014) claims that the minor effect risks have, the better it is dealt with in the end. Outside the various kinds of risk responses, The Institution of Structural Engineers (2007) described that it is occasionally hard for the project manager and team to make decisions anchored on very insufficient facts and information. This can be evaded by delaying the decision and waiting till the suitable facts and information are more accessible in order to handle risks in temporary structures in event project. However this risk management technique is not appropriate for every circumstance, particularly when dealing with critical risks.

2.2.2.4 Whole Life Risk Management Plan

Risk management plan is a process following the risk identification, risk analysis and risk responses where the project managers will prepare a report to predict risks, approximate risk effect, and describe risk responses to risks. It as well involves risk assessment matrix. This is a representation explanation of how risk management is supposed to be done. In whole life cycle risk management, risk management plan is a process that must go on until the last stage of project management life cycle (Boussabaine & Kirkham 2008). The procedure comprises of risk management forecasting, identification, analysis monitoring and control where these processes have to be always updated along the project life cycle as new risks may come up at any point of project life cycle. It is the goal of risk control and management to reduce the likelihood and effect of events adversative to the temporary structure in events project. On the other hand, an activity that has positive effect must be utilized to the advantage of temporary structure events project. Risk identification usually begins prior to the project initiation, and the number of risks rises as the temporary structure events project design grows through the life cycle (Soane & Cutlack 2017). When any risk is recognized, it is first evaluated to determine the likelihood of befalling, the amount of effects to the time, cost, scope, and quality, and then given priority. Risk actions can affect merely one or whereas others can affect the project in manifold affects classifications. The likelihood of manifestation, number of classifications affected and the level; high, medium, or low to which they influence the project will be the foundation for allocating the risk importance. Every detectable risk must be input to the risk registers, and created as a risk report. As part of recording risks in the process, two other significant things must be dealt with. The first measure is extenuation measures that may be put in place to lessen the likelihood of the risk arising. The other measure is a contingency plan, or a sequence of events that must be done either before, or during even occurrence (Lavagna et al. 2014).

Extenuation activities often come with certain cost implications. Occasionally the cost of extenuating risks may surpass the cost of assuming risks and incurring the implications. It is vital to assess the likelihood and effect of every risk against the extenuation plan cost prior deciding to execute a contingency plan. Contingency plans executed before risks occur are proactive actions anticipated to decrease the effect or eliminate risks in its totality. Contingency plans executed after risks occurrence may typically merely reduce the effect. Identifying and keeping a record of events that pose risks to the result of a temporary structure events project is fairly the initial stride. It is similarly imperative to monitor every risk on a timed basis by a risk supervision team, and conveyed on in the temporary structure events project status report (Lavagna et al. 2014).

2.2.2.5 Whole Life Risk Monitoring and Feedback

Risks are identified, dealt with and risk response activities are executed and operational. Risk monitoring will be carried on from the initial stage of the risk management life cycle to the last stage. Risk monitoring and control keeps track of the acknowledged risks, residual risks, and new risks. It as well monitors the implementation of strategic plans for the recognized risks and assesses their efficiency (Boussabaine & Kirkham 2008). Risk checking and control lasts all through the life cycle of the temporary structure event project. The listed items of project risks fluctuate as the project heads towards completion, fresh risks come up, or predicted risks vanish. Risk assessments and rankings may as well vary during the project life cycle.

Characteristically, when the project is under implementations, risk gatherings must be done on a regular basis to get updates on the right position of risks within the risk register, and increase fresh risks. According to Lavagna et al. (2014), this process of risk management may not happen very frequently in small temporary structure in events projects, and can only be required for moderate level which may be placed at early stage of each phase of project. Periodic project risks evaluations reprise the process of risks identification, analysis, and response strategizing. If unexpected risks emerge, or a risk's effect is bigger than anticipated, the strategic risk response might never be sufficient. The project manager, the members of the team must do extra risk responses to control the risks.

2.2.3 Whole Life Risk for Temporary Structure Projects

Before a temporary structure event projects is erected, cost and time are planned by the project manager. Cost is conventionally understood as the price of making client prospects. The cost of a temporary structure event project is normally calculated by appropriate quantifiable objectives and it might enhance risk responses. It is not possible to decrease the costs and define and eliminate causes for poor quality devoid of sacrificing project quality or deadlines. There exists a connection between project time and project costs. Time that each project activity takes must be controlled to avoid overspending which reduces the cost of the project (Boussabaine & Kirkham 2008).

2.2.3.1 Risk for Temporary Structure Projects at Pre-Erection Phase

This phase of temporary structure in event projects requires the client to provide a clear and realistic requirement including budget, usage, and venue. It is crucial that the contractor selected by client must be skilful and capable (CDM 2015). Time in temporary structure in event project is critical where the completion cannot be delayed, project manager has to properly plan the project schedule (The Institution of Structural Engineers 2007). Temporary structures projects are utilised in an extensive variation of conditions both externally and internally. Before the temporary structures are erected loadings must be spread in such way that weights and differential settlement are in the accepted standards. Contractors and licensing officials must be conscious that loading ground performance for temporary structures and that of the long term structures is considerably different (Ratay 2012).

The risks and hazards in temporary structure projects are various. The risk cause can come from internal sources and external sources such as natural disaster, wind or fire (CDM 2015). Therefore, before actual erection the temporary demountable structure contractor must make sure that an evaluation is undertaken of the possible threats and threats inherent in the methods needed for building and demolition (Mehdizadeh et al. 2013). This might need the temporary structure contractor to hire specialists. In terms of safety, temporary structure are not supposed to build on a ground that is not stable. In addition, temporary structure cannot be built using flammable materials. Moreover, temporary structure cannot be taken forward with half-finished design models. This will result in last minute changes, threatening the safety of people. Finally, the design should not be moved forward without the approval of a skilled structural engineer. If this is not done, the temporary demountable structure can be affected by intensify the risks of breakdown (The Institution of Structural Engineers 2007).

The risks involved in temporary structure's design and erection affect cost and time. Before a temporary structure is setup, the contractor must hire a specialist to check the materials which are used in the construction of a temporary structure. In addition, the contractor must purchase the recommended materials in order to avoid safety issues to the environment and people or users. The time taken to do all this work will as well affect the erection of the temporary structures. Unstable ground requires more time to stabilize before putting up the structure. But, stable ground will require less time to erect the temporary demountable structure (The Institution of Structural Engineers 1999).

According to The Institution of Structural Engineers (2007), there is a number of risks that need to be considered during planning and designing temporary structures including working at height, transportation, slips and trips, electrical energy and fire, loading and unloading processes, lifting processes, physical management, application of equipment and tools.

According to The Institution of Structural Engineers (2007), the temporary structure must be carefully considered that the structure has an appropriate determined wind loading and the dock stakes have capacity to endure sufficient force anchored on the ground, disposition and gravity. Furthermore, the fire the temporary structure must have fire retardant fabrics and has the prerequisite number of emergency doors. In addition, the temporary demountable structure contractor must note the manufacturer's determined size cautions and commence a risk evaluation to define the harmless approach to plan the seating schedules.

2.2.3.2 Risk for Temporary Structure Projects at Erection Phase

Before this stage starts, the design, drawings and approvals should be clear and completed. Every temporary structures' illustration and architecture support provided in the method statement must be correctly fitted to avoid any risks for the safety of operators (The Institution of Structural Engineers 1999). Project manager must divide the works and allocate sufficient manpower for completing the installation within timeline. The temporary structure must be carefully built by competent workers according to erection method statement and illustrations given. Every work at height should be completely evaluated and conducted in accordance with the checks and balances. Extreme care must be put in place in the use of right items in the right place and alignment. Every component must be sensibly united. They must never be twisted, slanted, or otherwise different to force fitting. Specific care must be given to rigidity of contacts. The twisting used to bolts and other connectors must be done according to manufacturer's approvals. Absolute care must be taken to make sure that every tie and bracing stated are properly fitted (The Institution of Structural Engineers 2007).

Site changes or adaptations to the design must never be done without a confirmation by the designer. With all the above mentioned things in mind, the costs of the erecting the temporary structures will be reduced, time taken to erect the temporary demountable structure will reduce and the safety of the operatives will be guaranteed. Without all the above mentioned precautions, the costs of the erecting the temporary demountable structures go high, time taken to erect the temporary demountable structure increase and the safety of the operatives will not be guaranteed (The Institution of Structural Engineers 2007).

2.2.3.3 Risk for Temporary Structure Projects at Event Phase

A proper management is vital to offer good safety for operators of temporary structures. Key facets that must be deliberated in planning control when the event is on. First, security manager must check monitor the event and take appropriate steps to ensure that temporary structures are utilise as planned and that security is never conceded or endangered (Soane & Cutlack 2017). Operators must never be allowed to the temporary structure till the safety controller is contented that it has been appropriately established and fulfils completely with the building standards. If the points listed above are complied with, the cost of the demountable structures will not be increased. In addition, if the event coordinator follow and manages the event in accordance with the regulations given, the safety of the users will be guaranteed and the event stage will smoothly run according to event schedule (Soane & Cutlack 2017).

According to The Institution of Structural Engineers (2007), there is a number of risks that are associated with event control and regulating users. First, the number of users allowed into the temporary structures must not exceed the number stated. If the number exceeds, the structure will be a safety risk.

According to The Institution of Structural Engineers (2007), event operators must never be allowed to use the temporary structure till the safety controller is contented that it has been appropriately established and fulfils completely with the building standards. If this is not done, then the temporary structures maybe cause a safety issue to users.

2.2.3.4 Risk for Temporary Structure Projects at demolition Phase

When the temporary structure is being demolished, the team undertaking the exercise must be careful and maintain the safety for all people within the surrounding environment. Every item at the height should be completely evaluated in compliance with the regulations and checks of Working at Height Guidelines (CDM 2015). According to Soane & Cutlack (2017), the safest demolition strategy will generally be to reverse the erection process. All the workforces that were used to construct temporary structures will thus be needed when demolishing any temporary structure. This would ensure that the workers are experiences and familiar with the components in order to prevent the items from bending, distortion or overstrained during disassembling. Slight injury to temporary structures can occur while in service and the broken items must be clearly marked for ease of identification when disassembling. The contractor must inspect every item for tear, distortion or damages if it is planned to be reused (Soane & Cutlack 2017).

2.2.4 Summary Whole Life Cycle Risk for Temporary Structure

In summary the potential risks that can affect the successful delivery which is measured on cost, time and quality or safety during the development and installation of temporary structure in event projects can be identified and shown in the table as follows;

Table 2.2.4-1: Risk Identification in each phase of temporary structure in event project

	Risk Identification at Pre-construction Phase	References
1	Unclear requirement regarding the budget	• The Institution of Structural Engineers (1999) • The Institution of Structural Engineers (2007) • Ratay (2012) • Mehdizadeh et al. (2013) • CDM (2015)
2	Unclear requirement regarding the users	
3	Unclear requirement regarding the venue	
4	Project timeline is not well planned or impractical	
5	Unrealistic expectations of stakeholders	
6	Not knowing stakeholders / responsibilities	
7	Incompetent designer or engineer	
8	Delay of design approval	
9	Delay of permission approval	
10	Internal communications are not coordinated and approved	

	Risk Identification at Erection Phase	References
1	Last minute design changes	• The Institution of Structural Engineers (1999) • The Institution of Structural Engineers (2007)
2	Insufficient information for contractor / unclear drawings	
3	Incompetent contractor	
4	Contractor does not comply with design and erection documentation	
5	Insufficient manpower	
6	Poor workmanship	
7	Low quality or defective material	
8	Not knowing responsibilities	
9	Safety plan is not prepared	
10	Inadequate quality controller	
11	Adverse weather condition	

	Risk Identification at Event Phase	References
1	Inadequate safety controlling and monitoring before the event starts	• The Institution of Structural Engineers (2007) • Soane & Cutlack (2017)
2	The regulations are not followed	
3	Delay of erection completion	
4	Improper event management	
5	Miscommunication between operators	
6	Temporary structure is not utilized as planned (ex. Overloading)	

7	Safety plan is not prepared	
8	Security staff are not properly trained and briefed	

Risk Identification at Demolition Phase		References
1	Incompetent contractor	• The Institution of Structural Engineers (2007) • CDM (2015) • Soane & Cutlack (2017)
2	Regulations and guideline for demolition are not followed	
3	Insufficient manpower	
4	Poor workmanship	
5	Not knowing responsibilities	
6	Safety plan is not prepared	
7	Inadequate quality controller	
8	Adverse weather condition	

3 CHAPTER THREE: RESEARCH FRAMEWORK and RESEARCH METHODOLOGY

This chapter will discuss about the research methodology and process for data collection used in this study. Previously, literature review has developed the understanding and formed the conceptual framework. The hypotheses for this study have been stated. In order to carry out the further investigation and answer the research questions, both qualitative and quantitative research methods have been adopted.

3.1 Research Methodology Flow

The process for this study represented as a research methodology's flow consists of four steps:

Step 1: Literature review

The introduction about the temporary structure, whole life risk management, then at the end the study identified all possible risks which may influence on the success of the development and installation of temporary structure in event projects.

Step 2: Comparative analysis

To analyze all risk events and categorize them based on the project phase of temporary structure in event projects.

Step 3: Questionnaire survey

In this step, the questionnaire was designed in order to gather information and feedback from experts who are involved in these types of projects.

Step 4: Data analysis

Using SPSS and Microsoft excel to analyze the data from the complete returned questionnaire and presenting in simple statistical formats. The heat map will be used to present the result in percentage for each risk.

3.2 Research Framework

This diagram intends to visualize the research framework of influence of risks on the success of development and installation of temporary structure in event projects based on the results from reviewing the literature. The following framework serves as a foundation for the research design and analysis for this study.

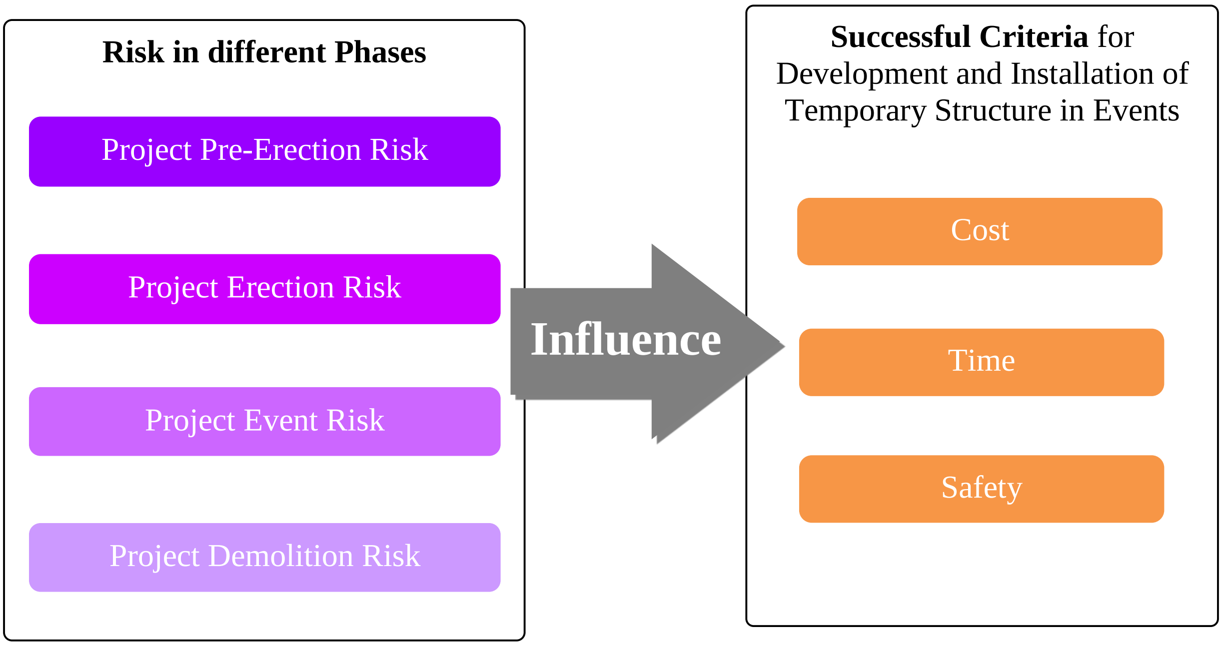

Figure 3.2-1: Research Framework for Successful Delivery of Temporary Structure in Event Projects

The diagram presents the risks in temporary structure in event project can be grouped into four categories based on the project phase and life cycle. In order to explore the influence of these risks on the successful deliver of temporary structure in events project, they must be measured the risk exposure on cost, time and safety which are the criteria for successful temporary projects according to the literature review.

3.3 Questionnaire

This study aims to find the risk influence on the success of development and installation of temporary structure in event projects. The relationship between its success criteria and risks emerging in each phase of project are outlined. As such, a quantitative method was adopted to gather the data from the clients, experts and professionals who have been involved in the development and installation process for the temporary structure in event projects in Dubai. The questionnaire is one of the most suitable approaches of quantitative research methods. It is often used to portray the particular individualities of a large number of people, matters, or organizations. According to Park & Park (2016), the questionnaire can be done through telephone, mail, face to face, or online survey. Although the online questionnaire has some disadvantages such as the participant' characteristic may be known quite little (Wright 2005), however the researcher decided to adopt this online based method apart from the traditional way as it can be conducted more quickly, effectively, inexpensively, and more convenient than surveys carried out via conventional manners (Fricker & Schonlau 2002). Since the research topic is in particular area, thus the researcher decided to create an online questionnaire and send the link through email specifically to selected people in order to control and receive the responses from experts who are involved in the development and installation of temporary structure in event projects only.

The online questionnaire for this study has been designed based on the framework developed from the literature review. The questions in this survey were constructed of the relative elements and were divided into five parts (as shown in Appendix 1):

First part:
Comprising of the questions to collect background information of the respondents such as gender, age, career position

2nd, 3rd, 4th and 5th part:
Comprising of the risk lists where the respondent shall rate the impact of each risk on the success of development and installation of the temporary structure in event from low to high impact based on the respondent's experience and knowledge base on the given risk probability matrix adopted from Prince 2 as shown below;

Table 3.3-1: Risk Matrix used in the questionnaire (adopted from Prince2)

PROBABILITY	**Very High (90%)**	**5%**	**9%**	**18%**	**36%**	**72%**
	High (70%)	**4%**	**7%**	**14%**	**28%**	**56%**
	Medium (50%)	**3%**	**5%**	**10%**	**20%**	**40%**
	Low (30%)	**2%**	**3%**	**6%**	**12%**	**24%**
	Very Low (10%)	**1%**	**1%**	**2%**	**4%**	**8%**
		Very Low (5%)	**Low (10%)**	**Medium (20%)**	**High (40%)**	**Very High (80%)**
		IMPACT				

However, in order to help the participant to perceive the meaning of each level in the same direction, there is the definition table provided as shown below;

Table 3.3-2: Risk Leve definition used in the questionnaire

Probability		
Scale		Meaning
5	Very High	>70% chance of occurrence
4	High	50% -70% chance of occurrence
3	Medi um	30% -50% chance of occurrence
2	Low	10% -30% of occurrence
1	Very Low	<10% chance of occurrence

Impact				
Scale		Impact on cost	Impact on Time	Impact on Safety
5	Very High	80% cost increase	>20% time increase	Fatality or multiple fatalities expected
4	High	40% cost increase	10%-20% time increase	Severe Injury or some potential for fatality
3	Medi um	20% cost increase	5%-10% time increase	Some potential for serious injuries or small fatality
2	Low	10% cost increase	< 5% time increase,	First aid required
1	Very Low	Insignificance cost increase	Insignificance or no concern	No concern

3.4 Research Sampling

The researcher has selected purposive random sampling for data collection where the result shall be reliable as the sampling group are only the experts and professionals who are physically involved with the development and installation of temporary structure in event projects (Bing et al.2005). According to Bernard (2007), when the study needs a specific feedback or information based on the experience and knowledge from particular persons or experts, purposive sampling technique is a suitable way to choose the sampling group. However, the researcher's bias on the purposive sampling can lead to unreliable findings or limited results for only the group within the study (Tongco 2007), therefore it is necessary to clarify the bias in the research findings to avoid having any interpretation for general summary (Bernard 2002). However in order to achieve more reliable findings, both random and purposive techniques may be integrated (Albertin & Nair 2004). Likewise, because of the time limit, this research has chosen to study within three companies which are engaged in the development and installation process of temporary structure in various types of event projects in Dubai, One is a large-size company running the business more than 40 years which has multiple locations around the world with awards from the event magazine. Another is the boutique company which has received awards for the best event organizer in Dubai for two years continuously, and the last company is one of the reputed contractors for temporary structure located in Dubai. The random technique is used for getting a participant within these companies.

3.5 Delivering/Collecting the Questionnaire

The total of 124 questionnaires including 86 online questionnaires and 38 offline questionnaires were distributed to the experts within those three companies mentioned earlier. The participants were explained thoroughly regarding the purpose of the survey and the guaranteed privacy. The total of 54 questionnaires was returned and only 39 copies are fully complete which can be computed to a nearly 32% response rate.

3.6 Data Analysis

This questionnaire's purpose is to discover the influence of risk on the success of development and installation of temporary structure in event projects, and the success criteria was identified earlier based on the literature review which are cost, time and safety. The Statistical Package for Social Sciences (SPSS) and Microsoft Excel are tools used for all data analyses in this study which consists of three main parts which are Descriptive Statistics, Frequency Analysis, and Heat Map.

3.6.1 Descriptive Statistics

The descriptive statistics is used to analyze and summarize a demographic data set received from the participants, then presented in a chart. The frequency distribution table and bar charts are adopted in this study to illustrate and give a briefed information about the respondents

3.6.2 Frequency Analysis

In statistics, frequency is an important part dealing with the number of times and occurrences. The results from frequency analysis are measures of central tendency within the data set such as mean, mode, and median, variance, and percentile.

Frequency analysis is applied for multiple choice questions, by computing the respondent's percentage. The participants in this study are asked to allocate the influence from risk events on the success criteria for temporary structure in event projects which are cost, time and safety. Then the score from each success criteria as indicated by the respondents based on their understanding and experience will be summarized and computed in order to comparatively rank the alternatives. The ranking will help the data analysis by revealing the unity in assessment among the respondents presenting in a Frequency Distribution Table where the percentage can be ascertained by using the formula as follows (Alireza et al. 2014):

$$\text{Respondent Percentage} = \frac{\text{Occurrence of Responses x 100\%}}{\text{Sums of Respondents}}$$

3.6.3 Heat Map

The heat map is a typical tool used in the frequency analysis to show levels and rankings. It is a graphical diagram of data where the scale of data presented in colours (Zhao et al. 2014). The data will be thoughtfully contained in the table in a matrix form showing in row and column which are hierarchical grouped by using shades of colours to present the value of data (Wilkinson & Friendly 2009).

The heat map tool has been used since late 19th century which is mostly used for bioinformatics shows (Cerdas et al. 2017). It comprises of a numbers of boxes which are highlighted on a shading colour to illustrate the gathered data (Wilkinson & Friendly 2009). Rajaram and Oono (2010) support that the heat map tool has moved toward becoming the most common illustration tool. The reason why the heat map became popular used is because it can simply present a large number of data between two factors which is suitable to display the collected data when the hypotheses in the research are studying between two factors. However the use of heat map also has a downside. Since the heat map is used to analyse and group a large amount of data then it may not follow the core relations and can probably lead to unreliable summary.

In this research, the heat map tool is adopted and used after the frequency analysis to visualize the influence of all risks on the success criteria and present in different degrees of colour shades. The benefit of using this tool is to easily and directly discover the risk's impact on success criteria by noticing the shades of rectangles as comparable value or massively diverse value (Wilkinson & Friendly 2009)

3.6.4 Relative Important Index (RII)

The last step of data analysis is to identify the significance of each risk and rank them according to their levels. The risk level to create the Relative Importance Index is calculated based on the risk exposure what is analysed from the collected data as per their perception on that risk by using the equation according to Ceric (2003) as shown below;

$$\text{Risk exposure} = \text{Risk Probability} \times \text{Risk Impact}$$

Summary

The quantitative and qualitative research methods including critical review and survey have been utilized for this investigation. The researcher has chosen purposive sampling group as the investigation needs certain input from experts. To accomplish that the online and face-to-face survey were chosen so as to guarantee that all respondents are experts in this area. The response rate is lower than 32%, however the legitimacy of the collected data is reasonably inferred as the sum of the responses is all from the experts. The Frequency Analysis, Heat Map and Relative Importance Index will be used to analyse the collected data which will be later discussed in the next chapter.

4 CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSION

This chapter aims to analyse the data collected from 39 complete questionnaires in order to achieve the research purpose of exploring the influence of risks on the success delivery of temporary structure in event project throughout its development and installation stages. There are three main techniques have been used for the analysis which was explained earlier in chapter 3 as follows;

- Descriptive Statistics
- Frequency Analysis
- Relative Important Index (RII)

4.1 Descriptive Statistics

Part A of the questionnaire, participant is characterized by three general questions which are the respondent's position, experience and size of projects that they regularly involve. The following tables show the respondent's demographic and respective frequencies;

The total number of respondent was 39 from 7 different working position categories. The majority of respondent is working as a project manager (30.8%), followed by the project coordinator position (20.5%). The least number of participant is others (2.6%), sub-Contractor/Supplier (7.7%) which has the same count to the estimator (7.7%).

Table 4.1-1: Respondent's position in temporary structure in event projects

Respondent's position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Project Manager	12	20.3	30.8	30.8
	Project Coordinator	8	13.6	20.5	51.3
	Designer	5	8.5	12.8	64.1
	Estimator	3	5.1	7.7	71.8
	Contractor	7	11.9	17.9	89.7
	Sub-Contractor/Supplier	3	5.1	7.7	97.4
	Others	1	1.7	2.6	100.0
	Total	39	66.1	100.0	
Missing	System	20	33.9		
Total		59	100.0		

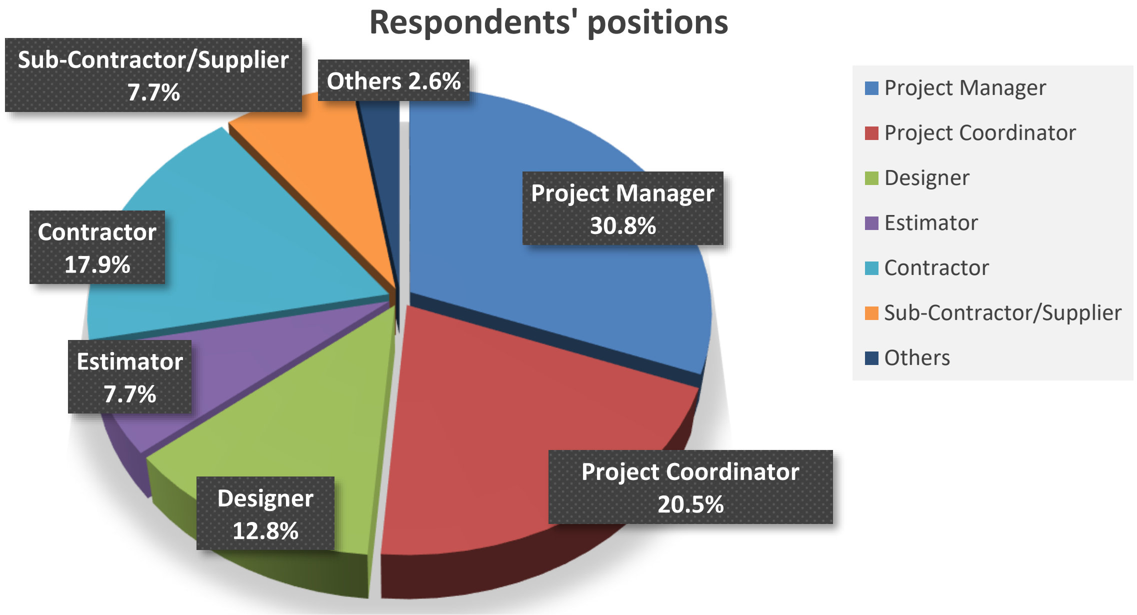

Figure 4.1-1: Respondent's position

The below table and diagram illustrate the respondent's years of experience. It is nearly half of respondents having the experience within these temporary structures in event projects over 10 years which was 43.6%, followed by 5 to 10 year experience (28.2%). There is 7.7% that has the experience less than 3 years which is the smallest group among all respondents.

Table 4.1-2: Respondent's year of experience in temporary structure in event projects

Respondent's Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 3years	3	5.1	7.7	7.7
	3-5 years	8	13.6	20.5	28.2
	5-10 years	11	18.6	28.2	56.4
	More than 10 years	17	28.8	43.6	100.0
	Total	39	66.1	100.0	
Missing	System	20	33.9		
Total		59	100.0		

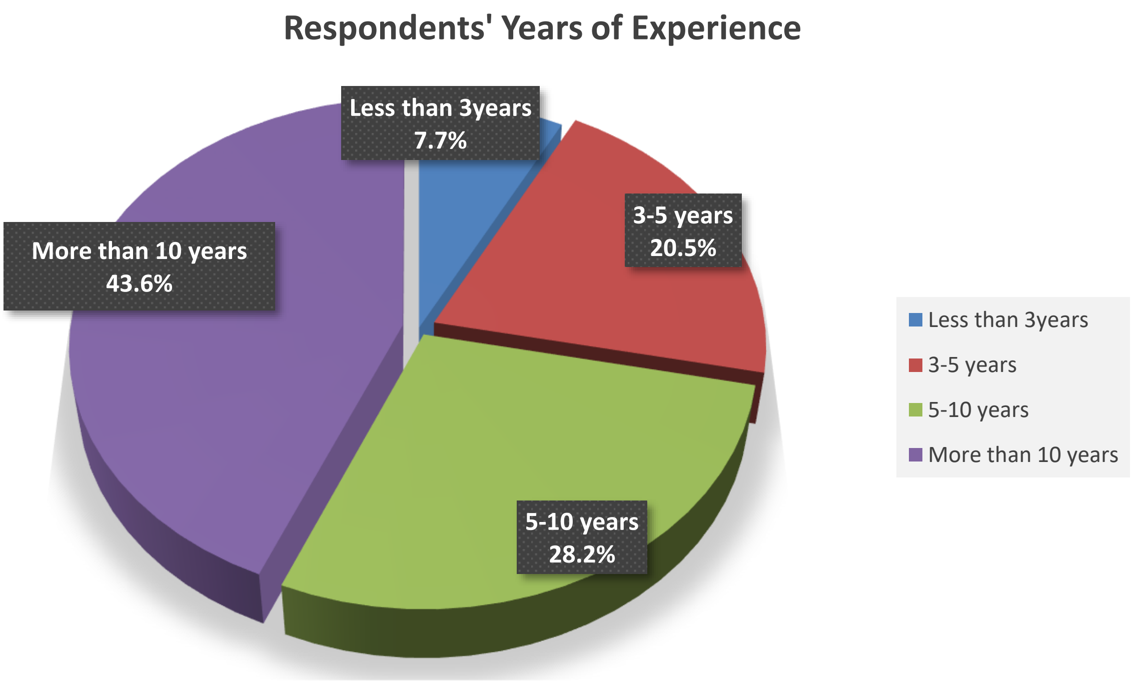

Figure 4.1-2: Respondent's years of experience

The last demographic data collected from the questionnaire is the project size that respondents commonly get involved. The data is measured based on the budget of the projects which was divided into four groups from the smallest project size which is below AED100,000 to the large size with the project budget over 1 million. As presented in the table and diagram below, 48.7% of the participants is normally working on the large temporary structure project, followed by the second large-sized (AED 500,000 – 1 million) 33.3%. The least number of respondents is working in the small temporary structure projects (less than AED 100,000) which is only 2.6% of all respondents.

Table 4.1-3: Respondent's project size involved in temporary structure in event projects

Sizes of the projects involve

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than AED 100K	1	1.7	2.6	2.6
	AED 100K-500K	6	10.2	15.4	17.9
	AED 500K-1M	13	22.0	33.3	51.3
	More than 1M	19	32.2	48.7	100.0
	Total	39	66.1	100.0	
Missing	System	20	33.9		
Total		59	100.0		

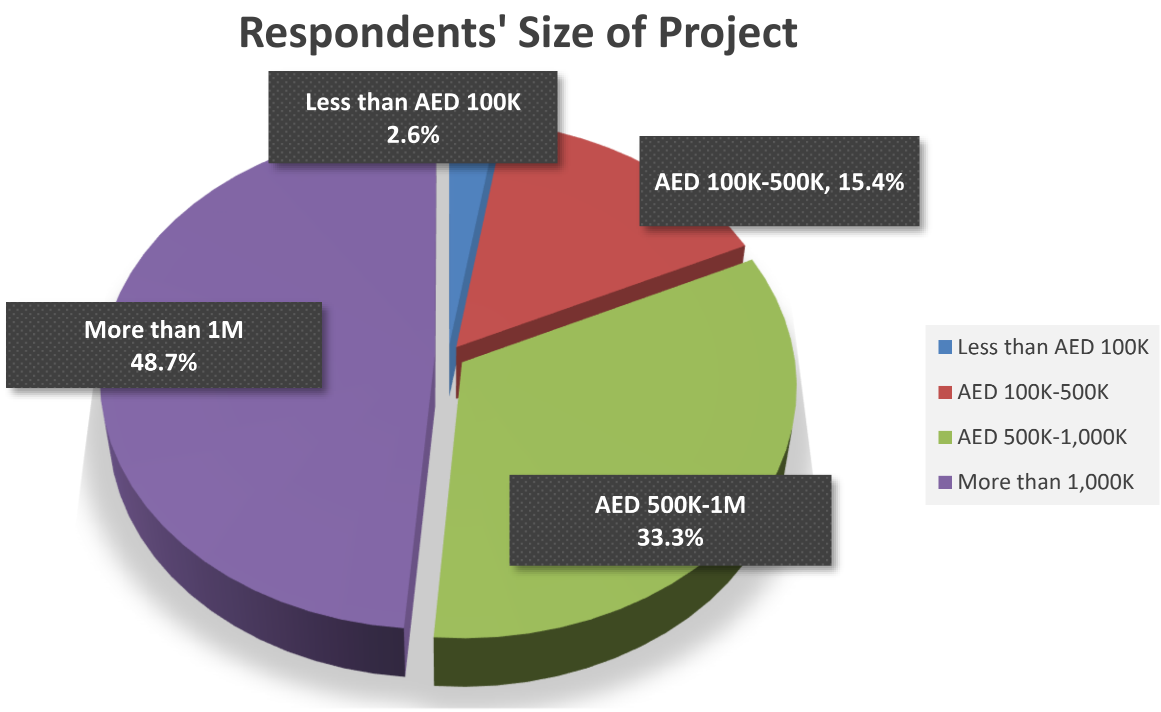

Figure 4.1-3: Respondent's size of project

4.2 Data Frequencies Analysis

The second step of data analysis is to observe the frequencies of risk probability and risk impact rating value of each risk throughout the 4 phases of temporary structure project's life cycle. SPSS and Microsoft Excel were used in this step to illustrate the frequencies according to the participants' responses collected from the questionnaire in part 2nd, 3rd, 4th and 5th.

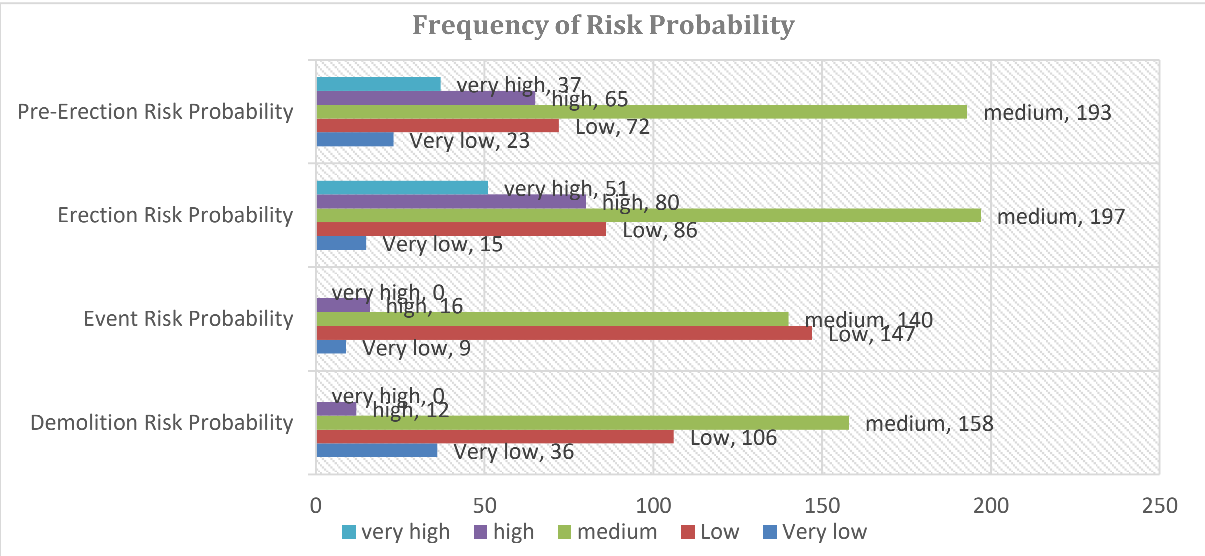

Figure 4.2-1: Frequency distribution diagram of risk probability throughout the temporary structure project life cycle

The above figure illustrates the risk probability's frequency rate according to the respondent's opinion. It shows that potential risks during pre-erection phase has a highest rate on medium risk probability (49%) among the other probability levels in the pre-erection phase which can be concluded that the majority of the respondents believe that most of potential risks during pre-erection phase of temporary structure has medium level of chance to happen followed by low level of risk probability (18%). Similarly, the potential risks during erection stage and demolition stage are mostly believed by the respondents that risks are in medium level of probability (46% and 51%), followed by low level of probability (20% and 34%). The potential risks during event stage are mostly rated to have low probability (47%) which is slightly higher than the medium level (45%).

Then below figures presents the responses' frequencies of risk impact on cost, time and safety within four phases of temporary structure project which are shown individually and responsively in four diagram. During pre-erection phase, potential risks were mostly perceived to have high-levelled impact on cost and safety, and very high levelled impact on time. During erection phase, potential risks were mainly rated to have a high levelled impact on time and safety and very high on cost. However there were no risks recognized to have low and very low levelled impact during this erection phase.

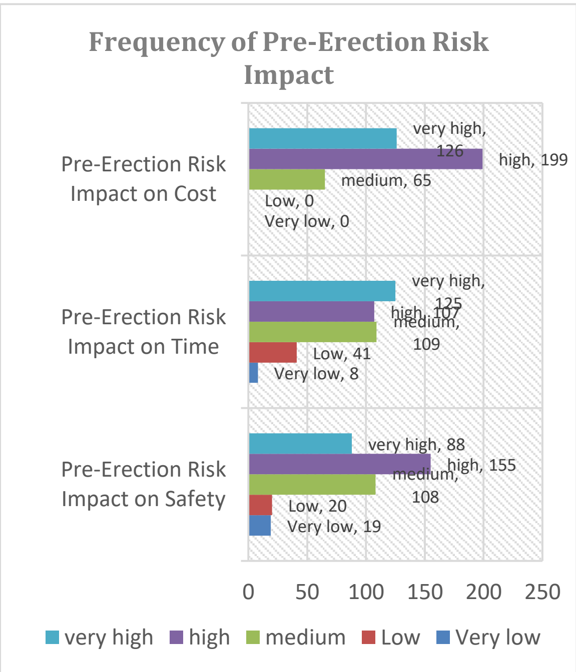

Figure 4.2-2: Frequency distribution diagram of risk impact on cost, time and safety during pre-erection phase

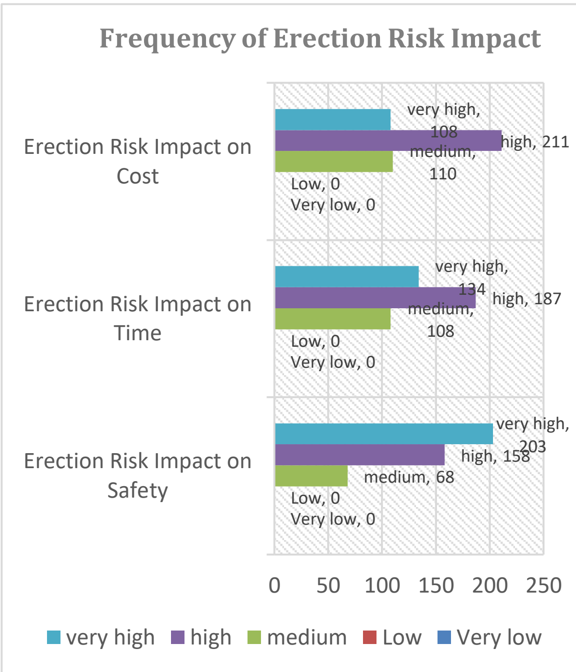

Figure 4.2-3: Frequency distribution diagram of risk impact on cost, time and safety during erection phase

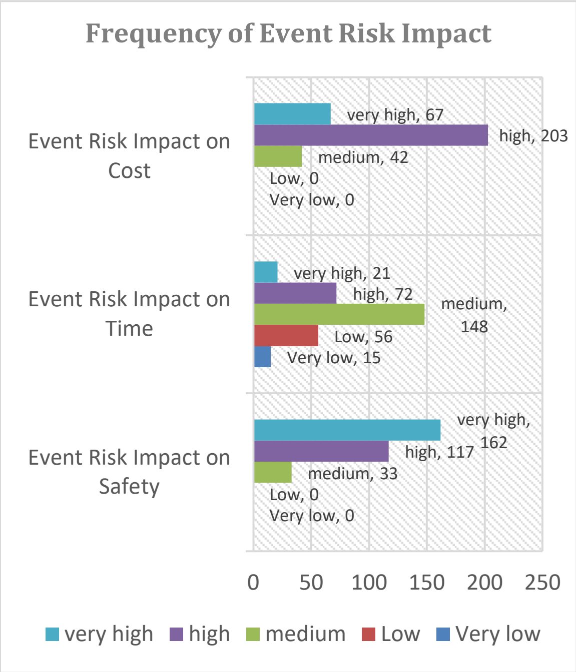

Figure 4.2-4: Frequency distribution diagram of risk impact on cost, time and safety during event phase

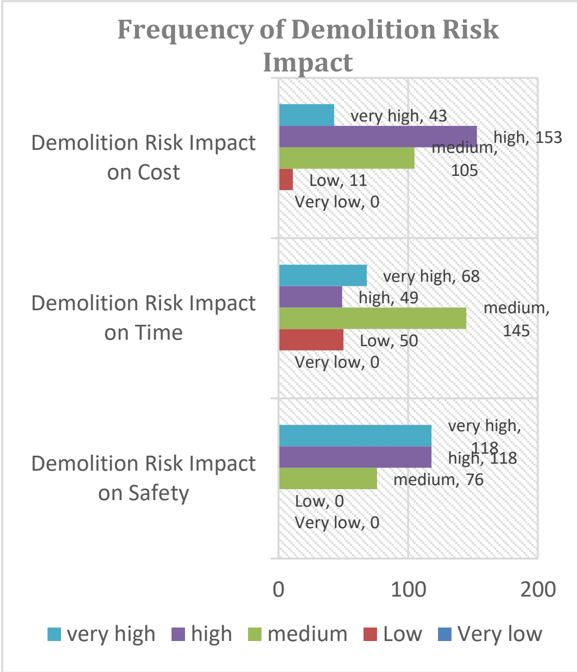

Figure 4.2-5: Frequency distribution diagram of risk impact on cost, time and safety during demolition

During event phase, potential risks are frequently perceived to have very high impact on safety, high on cost and medium on time. Last, the demolition phase, potential risks were rated to have a high levelled impact on cost, medium on time, and very high and high on safety where there are no risks rated to have very low levelled impact.

4.3 Relative Importance Index (RII)

In order to answer the study aim which is finding the influence of risk in temporary structure project, each risk's level and its significance is analysed in this stage. All risks have been coded and SPSS was used to identify the means value of each risk probability and risk impact. In order to analyse the risk significance, the risk exposure was calculated by using the equation as follows;

$$\text{Risk exposure} = \text{Risk Probability} \times \text{Risk Impact}$$

Then the heat map tool was applied to simplify the information where the levels can be observed more easily where the low level rating will be highlighted in green and gradually become red for a very high level rating.

Table 4.3-1: The heat map shows the risk probability, impact and risk exposure

		Means				Risk Exposure = (P)x(I)		
		Probability Level (P)	Impact Level (I) on Cost	on Time	on Safety	Cost	Time	Safety
Pre-Erection Phase								
PR1	Unclear requirement regarding the budget	2.72	4.10	2.41	1.51	11.15	6.56	4.11
PR2	Unclear requirement regarding the users	2.38	3.85	2.13	4.59	9.16	5.07	10.92
PR3	Unclear requirement regarding the venue	2.77	4.41	3.26	4.59	12.22	9.03	12.71
PR4	Project timeline is not well planned or impractical	2.10	4.41	4.36	3.59	9.26	9.16	7.54
PR5	Unrealistic expectations of stakeholders	4.00	4.38	4.03	3.54	17.52	16.12	14.16
PR6	Not knowing stakeholders / responsibilities	2.62	3.59	4.49	3.67	9.41	11.76	9.62
PR7	Incompetent designer or engineer	2.51	4.44	4.41	4.56	11.14	11.07	11.45
PR8	Delay of design approval	4.44	4.59	4.72	3.77	20.38	20.96	16.74
PR9	Delay of permission approval	3.74	4.13	4.33	3.51	15.45	16.19	13.13
PR10	Internal communications are not coordinated and approved	3.28	3.67	3.56	3.67	12.04	11.68	12.04
Erection Phase								
ER1	Last minute design changes	4.41	4.41	3.54	4.69	19.45	15.61	20.68
ER2	Insufficient information for contractor / unclear drawings	2.79	3.74	4.32	4.13	10.43	12.05	11.52
ER3	Incompetent contractor	3.41	3.85	3.97	4.69	13.13	13.54	15.99
ER4	Contractor does not comply with design and erection documentation	3.82	3.87	3.64	4.77	14.78	13.90	18.22
ER5	Insufficient manpower	4.03	4.62	4.46	3.33	18.62	17.97	13.42
ER6	Insufficient manpower	3.59	4.00	3.97	4.77	14.36	14.25	17.12
ER7	Low quality or defective material	2.77	3.59	3.49	4.41	9.94	9.67	12.22
ER8	Not knowing responsibilities	2.10	3.36	4.41	3.69	7.06	9.26	7.75
ER9	Safety plan is not prepared	2.41	4.69	3.85	4.69	11.30	9.28	11.30
ER10	Inadequate quality controller	3.41	4.23	3.82	4.62	14.42	13.03	15.75
ER11	Adverse weather condition	1.95	3.59	4.21	3.67	7.00	8.21	7.16
Event Phase								
EV1	Inadequate safety controlling and monitoring before the event starts	2.41	4.38	3.41	4.85	10.56	8.22	11.69
EV2	The regulations are not followed	2.41	4.23	3.62	4.72	10.19	8.72	11.38
EV3	Delay of erection completion	3.41	4.21	4.33	3.56	14.36	14.77	12.14
EV4	Improper event management	2.41	3.92	2.38	4.13	9.45	5.74	9.95
EV5	Miscommunication between operators	2.41	3.77	2.05	4.05	9.09	4.94	9.76
EV6	Temporary structure is not utilized as planned (ex. Overloading)	2.77	3.59	2.41	4.59	9.94	6.68	12.71
EV7	Safety plan is not prepared	1.95	4.28	3.41	4.74	8.35	6.65	9.24
EV8	Security staff are not properly trained and briefed	2.41	4.26	3.10	4.67	10.27	7.47	11.25
Demolition Phase								
DE1	Incompetent contractor	2.90	3.69	4.36	4.41	10.70	12.64	12.79
DE2	Regulations and guideline for demolition are not followed	2.41	3.82	2.72	4.77	9.21	6.56	11.50
DE3	Insufficient manpower	3.31	4.41	4.41	3.41	14.60	14.60	11.29
DE4	Poor workmanship	2.67	4.05	2.67	4.41	10.81	7.13	11.77
DE5	Not knowing responsibilities	2.21	2.72	4.10	3.46	6.01	9.06	7.65
DE6	Safety plan is not prepared	1.85	4.00	2.79	4.54	7.40	5.16	8.40
DE7	Inadequate quality controller	2.79	3.56	2.59	4.69	9.93	7.23	13.09
DE8	Adverse weather condition	1.62	3.59	3.82	3.38	5.82	6.19	5.48

According to the above table, it can be observed that the highest probability of risk occurrence is risk PR8: Delay of design approval (4.44) which is under the pre-erection project phase, followed by risk ER1: Last minute design change (4.41) during erection phase, risk ER5:

Insufficient manpower during project erection (4.03) and risk PR5: Unrealistic expectations of stakeholders (4.00) during pre-erection phase.

Once the above equation was applied for each risk exposure, each risk can be observed the exposure within three aspects which are cost, time and safety. In term of risk exposure on cost, the highest level is risk PR8: Delay of design approval (20.38) during pre-erection phase, followed by risk ER1: Last minute design change (19.45) during erection phase, and the risk with lowest level of exposure on cost is riskDE8: Adverse weather condition (5.82). The risk exposure on time, risk ER1: Last minute design change during pre-erection phase is in the highest rank (20.96), followed by risk ER5: Insufficient manpower (17.97) in erection phase. Risk EV5: Miscommunications between operators during event phase is in the lowest rank (4.94). Risk ER1: Last minute design change during erection phase (20.68) is ranked the highest risk exposure within safety aspect, and risk PR1: Unclear requirement regarding the budget (4.11) during pre-erection phase has the least risk exposure level on safety.

Then the rating value for each risk was computed based on the overall exposure in order to rank the significance of risk and distribute a Relative Importance Index (RII) as presented in the *Table 4.3-2*.

According to the below table, among 37 potential risks in the temporary structure in event projects, the first three ranking with highest rating values are risk PR8: Delay of design approval during pre-erection phase (58.08), risk ER1: Last minute design changes during erection phase (55.74), and risk ER5: Insufficient manpower during erection phase (50.01) respectively. The three risks with least rating values are risk DE8: Adverse weather condition (17.48), risk DE6: Safety plan is not prepared (20.96), and risk PR1: Unclear requirement regarding the budget (21.81).

Table 4.3-2: Risk significance ranking

Risk Code	Risk Description	Rating Value	Rank
PR8	Delay of design approval	58.08	**1**
ER1	Last minute design changes	55.74	**2**
ER5	Insufficient manpower	50.01	**3**
PR5	Unrealistic expectations of stakeholders	47.80	**4**
ER4	Contractor does not comply with design and erection documentation	46.91	**5**
ER6	Insufficient manpower	45.74	**6**
PR9	Delay of permission approval	44.77	**7**
ER10	Inadequate quality controller	43.20	**8**
ER3	Incompetent contractor	42.66	**9**
EV3	Delay of erection completion	41.26	**10**
DE3	Insufficient manpower	40.48	**11**
DE1	Incompetent contractor	36.13	**12**
PR10	Internal communications are not coordinated and approved	35.75	**13**
ER2	Insufficient information for contractor / unclear drawings	34.01	**14**
PR3	Unclear requirement regarding the venue	33.96	**15**
PR7	Incompetent designer or engineer	33.66	**16**
ER9	Safety plan is not prepared	31.88	**17**
ER7	Low quality or defective material	31.83	**18**
PR6	Not knowing stakeholders / responsibilities	30.79	**19**
EV1	Inadequate safety controlling and monitoring before the event starts	30.46	**20**
EV2	The regulations are not followed	30.29	**21**
DE7	Inadequate quality controller	30.24	**22**
DE4	Poor workmanship	29.72	**23**
EV6	Temporary structure is not utilized as planned (ex. Overloading)	29.33	**24**
EV8	Security staff are not properly trained and briefed	28.99	**25**
DE2	Regulations and guideline for demolition are not followed	27.26	**26**
PR4	Project timeline is not well planned or impractical	25.96	**27**
PR2	Unclear requirement regarding the users	25.16	**28**
EV4	Improper event management	25.14	**29**
EV7	Safety plan is not prepared	24.24	**30**
ER8	Not knowing responsibilities	24.07	**31**
EV5	Miscommunication between operators	23.79	**32**
DE5	Not knowing responsibilities	22.72	**33**
ER11	Adverse weather condition	22.37	**34**
PR1	Unclear requirement regarding the budget	21.81	**35**
DE6	Safety plan is not prepared	20.96	**36**
DE8	Adverse weather condition	17.48	**37**

5 CHAPTER FIVE: CONCLUSION AND RECCOMENDATIONS

This chapter provides the conclusion and main findings of this research based on the data analysis in the previous chapter. At the end, the limitations and recommendations are also provided for the future research.

5.1 Conclusions

The influence of risks on the success of projects can be varied depending on the project type. The temporary structure in event projects depends its success on the development and installation process. The researcher outlined the study framework based on project life cycle of temporary structure in event projects by merging the risk management process with whole life cycle risk management technique. In order to achieve three main research objectives which are to identify temporary structure's project life cycle, to categorise and rank the risk significance, and to explain the risks' influences on project success, both qualitative and quantitative research methods were adopted. The findings can be summarized as follow;

1. **Project life cycle of temporary structure in event project**

This research objective was done through the literature review. In summary, the temporary structure in event project is classified as a construction project for the entertainment industry (CDM 2015). Project life cycle for the temporary structure in event is considered and combined between a traditional construction's project life cycle and event project management which were concluded and divided into 4 phases which are Pre-Erection, Erection, Event, and Demolition (The Institution of Structural Engineers (2007).

2. **Risk Identification, risk significance and ranking**

Risk identification was studied and listed based on the reviewing of previous studies, research paper, books and published articles. Then the findings for risk significance and risk ranking were explained by analysing the data collected from the returned questionnaire, both offline and online questionnaires. The data provided the risk probability and impact which helped the researcher to identify the risk exposure and rank the risk significance.

In summary there are 37 potential risks listed throughout project life cycle of temporary structure in event project

- 10 risks during Pre-Erection phase
- 11 risks during Erection phase
- 8 risks during Event phase

- 8 risks during Demolition phase

The below table presents the significant risks with very high rating value which has the value above 40. From the table, the most significant risk is the risk arises during pre-event phase, and there are three risks during pre-erection phase listed. However there are six risks during the erection phase listed which is the highest number among the other phases. This can be inferred that **the risks during the Erection phase are likely to be most critical risks for the successful delivery of temporary structure in event project** while the risks during Event and Demolition phase have less significant influence on the success of temporary structure.

Table 5.1-1: Most significant risks throughout project life cycle of temporary structure

Rank	Risk Code	Risk Description	Rating Value	Risk Category
1	PR8	Delay of design approval	58.08	Pre-Erection
2	ER1	Last minute design changes	55.74	Erection
3	ER5	Insufficient manpower	50.01	Erection
4	PR5	Unrealistic expectations of stakeholders	47.80	Pre-Erection
5	ER4	Contractor does not comply with design and erection documentation	46.91	Erection
6	ER6	Insufficient manpower	45.74	Erection
7	PR9	Delay of permission approval	44.77	Pre-Erection
8	ER10	Inadequate quality controller	43.20	Erection
9	ER3	Incompetent contractor	42.66	Erection
10	EV3	Delay of erection completion	41.26	Event
11	DE3	Insufficient manpower	40.48	Demolition

3. Risks' influences on project success

This objective was also answered by using the quantitative research method through the questionnaire. It is a parallel step to the 2nd research objective. According to the literature review, the measurement for the success of the development and installation for temporary structure in events can be judged base on three criteria including cost, time and safety. The below table explains the influence of significant risks from previous table on three aspects.

It can be observed that **the risk during Pre-Erection phase is likely to have more significant influence on project success within the cost and time aspects, while the project success in**

the aspect of safety is more likely to receive significant influence from the risk during Erection phase.

Table 5.1-2: Risks' influences on project success

Rank	Risk Code	Risk Description	Cost	Time	Safety
1	**PR8**	Delay of design approval	20.38	20.96	16.74
2	**ER1**	Last minute design changes	19.45	15.61	20.68
3	**ER5**	Insufficient manpower	18.62	17.97	13.42
4	**PR5**	Unrealistic expectations of stakeholders	17.52	16.12	14.16
5	**ER4**	Contractor does not comply with design and erection documentation	14.78	13.90	18.22
6	**ER6**	Insufficient manpower	14.36	14.25	17.12
7	**PR9**	Delay of permission approval	15.45	6.19	13.13
8	**ER10**	Inadequate quality controller	14.42	13.03	15.75
9	**ER3**	Incompetent contractor	13.13	13.54	15.99
10	**EV3**	Delay of erection completion	14.36	14.77	12.14
11	**DE3**	Insufficient manpower	14.60	14.60	11.29

5.2 Research Implications and Contributions

There is a number of previous studies study on the risk management in generic construction project. However the knowledge in risk influence on the success delivery of temporary structure in event projects have never been focused. This study contributes to knowledge in several ways. The study is first to illustrate the project life cycle and phase of temporary structure and distinguish the difference between these types of projects and generic construction projects. Then the study had provided the knowledge of risk management process within the temporary structure in event projects.

The risk identification studied in this research and the influence of risks throughout the life cycle have formed a strong idea and can be a foundation for project managers or stakeholders to plan for the risk management for the temporary structure in event projects.

Furthermore the decision makers can be assisted by the risk Relative Importance Index summarized in this study which has illustrated the degree of risk's severity and the significance of each risk's influence on the successful delivery of temporary structure in event project. The decision makers also are able to consider the risk's importance and make decision through the weight of risk impact on each aspect of temporary structure's project success which are cost, time and safety.

Furthermore, the study has presented that the risk during Pre-Erection and Erection are the most significant especially the risks related to the design and manpower which is advised by The Institute of Structural of Engineers (2007) that the client must allocate the competent people including designers, engineers and contractors to take care the jobs at the beginning of the project.

5.3 Research Limitations

Though the temporary structures are ordinarily used in the event projects including the event projects in Dubai, however the information is very scattered. With the time constraint, researcher was limited on a data collection. Firstly the data collection had a limitation where the researcher was not able to approach every group of stakeholders in the temporary structure in event projects. The client group was not included in the questionnaire' samplings. Then the questionnaire was distributed only among the organization who have been involved with temporary structure. However it is another limitation where the questionnaire was done within only three organizations. Though these three organizations are in the different positions in Dubai market, but the research findings may not be able to imply to all types of temporary structures in event projects in Dubai. Nevertheless the findings are likely suitable to be an initial guide.

5.4 Recommendations for further Research

In summary, the future researcher can benefit from this study by using the findings as the foundation. The future researcher is able to refer to the framework used in this study for similar temporary structure projects in event industry. The framework for whole life cycle risk management for the temporary structure in events can be used as the basis for the further study including the risk categories, risk identification and risk significance.

The future research is suggested to expand the sampling group for data collection in order to imply the research results for the all types of temporary structure in event projects. The responses from all stakeholder should be taken into consideration especially the client's feedback as it is a vital part of risk responsibility in the temporary projects.

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APPENDICES

Appendix I: Questionnaire for the research survey

Dear Participant,

This questionnaire is part of research effort to better understand **the risk influence on the success of development and installation of temporary structure in event project**s. It will feature as part of a study whose objective is to define the significance of risk on project success. Please rest assured that the information you share here is treated with the utmost confidentiality and all measures will be taken to ensure your anonymity is protected.

Should you have any questions, concerns, or wish to know more about the results of the research please feel free to contact the researcher at:

Email: 2015303007@student.buid.ae.ac

Thank you for your input.
Pavinee Poobampen

A- GENERAL INFORMATION

- **Respondent's position involved in Temporary Structure Projects:**

☐ Project Manager ☐ Project Coordinator
☐ Designer ☐ Estimator
☐ Contractor ☐ Sub-Contractor/Supplier
☐ Others

- **Respondent's Experience:**

☐ Less than 3 years ☐ 3-5 years
☐ 5 - 10 years ☐ More than 10 years

- **Sizes of the projects involve:**

☐ Less than 100,000 AED ☐ 100,000 – 500,000 AED
☐ 500,000 - 1,000,000 AED ☐ More 1,000,000 AED

B- The influence of risks during pre-erection phase on success criteria of temporary structure project in events (Cost / Time / Safety)

Please rate the influence/impact of the following risks on cost, time and safety by referring to the matrix below,

Probability		
Scale		Meaning
5	Very High	>70% chance of occurrence
4	High	50% -70% chance of occurrence
3	Medium	30% -50% chance of occurrence
2	Low	10% -30% of occurrence
1	Very Low	<10% chance of occurrence

Impact				
Scale		Impact on cost	Impact on Time	Impact on Safety
5	Very High	80% cost increase	>20% time increase	Fatality or multiple fatalities expected
4	High	40% cost increase	10%-20% time increase	Severe Injury or some potential for fatality
3	Medium	20% cost increase	5%-10% time increase	Some potential for serious injuries or small fatality
2	Low	10% cost increase	< 5% time increase,	First aid required
1	Very Low	Insignificance cost increase	Insignificance or no concern	No concern

	Risk Factors	Risk **Probability Level** (1-5)	Risk **impact on Cost** (1 – 5)	Risk **impact on Time** (1 – 5)	Risk **impact on Safety** (1 – 5)
1	Unclear requirement regarding the budget				
2	Unclear requirement regarding the users				
3	Unclear requirement regarding the venue				
4	Project timeline is not well planned or impractical				
5	Unrealistic expectations of stakeholders				
6	Not knowing stakeholders / responsibilities				
7	Incompetent designer or engineer				
8	Delay of design approval				
9	Delay of permission approval				
10	Internal communications are not coordinated and approved				

C- The influence of risks during erection phase on success criteria of temporary structure project in events (Cost / Time / Safety)

Please rate the influence/impact of the following risks on cost, time and safety by referring to the matrix below,

Probability		
Scale		Meaning
5	Very High	>70% chance of occurrence
4	High	50% -70% chance of occurrence
3	Medium	30% -50% chance of occurrence
2	Low	10% -30% of occurrence
1	Very Low	<10% chance of occurrence

Impact				
Scale		Impact on cost	Impact on Time	Impact on Safety
5	Very High	80% cost increase	>20% time increase	Fatality or multiple fatalities expected
4	High	40% cost increase	10%-20% time increase	Severe Injury or some potential for fatality
3	Medium	20% cost increase	5%-10% time increase	Some potential for serious injuries or small fatality
2	Low	10% cost increase	< 5% time increase,	First aid required
1	Very Low	Insignificance cost increase	Insignificance or no concern	No concern

Risk Factors		Risk **Probability Level** (1-5)	Risk **impact on Cost** (1 – 5)	Risk **impact on Time** (1 – 5)	Risk **impact on Safety** (1 – 5)
1	Last minute design changes				
2	Insufficient information for contractor / unclear drawings				
3	Incompetent contractor				
4	Contractor does not comply with design and erection documentation				
5	Insufficient manpower				
6	Poor workmanship				
7	Low quality or defective material				
8	Not knowing responsibilities				
9	Safety plan is not prepared				
10	Inadequate quality controller				
11	Adverse weather condition				

D- The influence of risks during event phase on success criteria of temporary structure project in events (Cost / Time / Safety)

Please rate the influence/impact of the following risks on cost, time and safety by referring to the matrix below,

Probability		
Scale		Meaning
5	Very High	>70% chance of occurrence
4	High	50% -70% chance of occurrence
3	Medium	30% -50% chance of occurrence
2	Low	10% -30% of occurrence
1	Very Low	<10% chance of occurrence

Impact				
Scale		Impact on cost	Impact on Time	Impact on Safety
5	Very High	80% cost increase	>20% time increase	Fatality or multiple fatalities expected
4	High	40% cost increase	10%-20% time increase	Severe Injury or some potential for fatality
3	Medium	20% cost increase	5%-10% time increase	Some potential for serious injuries or small fatality
2	Low	10% cost increase	< 5% time increase,	First aid required
1	Very Low	Insignificance cost increase	Insignificance or no concern	No concern

Risk Factors		Risk **Probability Level** (1-5)	Risk **impact on Cost** (1 – 5)	Risk **impact on Time** (1 – 5)	Risk **impact on Safety** (1 – 5)
1	Inadequate safety controlling and monitoring before the event starts				
2	The regulations are not followed				
3	Delay of erection completion				
4	Improper event management				
5	Miscommunication between operators				
6	Temporary structure is not utilized as planned (ex. Overloading)				
7	Safety plan is not prepared				
8	Security staff are not properly trained and briefed				

E- The influence of risks during demolition phase on success criteria of temporary structure project in events (Cost / Time / Safety)

Please rate the influence/impact of the following risks on cost, time and safety by referring to the matrix below,

Probability		
Scale		Meaning
5	Very High	>70% chance of occurrence
4	High	50% -70% chance of occurrence
3	Medium	30% -50% chance of occurrence
2	Low	10% -30% of occurrence
1	Very Low	<10% chance of occurrence

Impact				
Scale		Impact on cost	Impact on Time	Impact on Safety
5	Very High	80% cost increase	>20% time increase	Fatality or multiple fatalities expected
4	High	40% cost increase	10%-20% time increase	Severe Injury or some potential for fatality
3	Medium	20% cost increase	5%-10% time increase	Some potential for serious injuries or small fatality
2	Low	10% cost increase	< 5% time increase,	First aid required
1	Very Low	Insignificance cost increase	Insignificance or no concern	No concern

Risk Factors		Degree of Risk impact on **Cost** (1 %-72%)	Degree of Risk impact on **Time** (1 %-72%)	Degree of Risk impact on **Safety** (1 %-72%)
1	Incompetent contractor			
2	Regulations and guideline for demolition are not followed			
3	Insufficient manpower			
4	Poor workmanship			
5	Not knowing responsibilities			
6	Safety plan is not prepared			
7	Inadequate quality controller			
8	Adverse weather condition			

Appendix II: Means Value for Risk Probability

```
MEANS TABLES=PPR1 PPR2 PPR3 PPR4 PPR5 PPR6 PPR7 PPR8 PPR9 PPR10 PER1 PER2 PE
R3 PER4 PER5 PER6 PER7 PER8 PER9 PER10 PER11 PEV1 PEV2 PEV3 PEV4 PEV5 PEV6 P
EV7 PEV8 PDE1 PDE2 PDE3 PDE4 PDE5 PDE6 PDE7 PDE8
  /CELLS=MEAN COUNT STDDEV SUM SKEW.
```

Means

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
P-PR1	39	66.1%	20	33.9%	59	100.0%
P-PR2	39	66.1%	20	33.9%	59	100.0%
P-PR3	39	66.1%	20	33.9%	59	100.0%
P-PR4	39	66.1%	20	33.9%	59	100.0%
P-PR5	39	66.1%	20	33.9%	59	100.0%
P-PR6	39	66.1%	20	33.9%	59	100.0%
P-PR7	39	66.1%	20	33.9%	59	100.0%
P-PR8	39	66.1%	20	33.9%	59	100.0%
P-PR9	39	66.1%	20	33.9%	59	100.0%
P-PR10	39	66.1%	20	33.9%	59	100.0%
P-ER1	39	66.1%	20	33.9%	59	100.0%
P-ER2	39	66.1%	20	33.9%	59	100.0%
P-ER3	39	66.1%	20	33.9%	59	100.0%
P-ER4	39	66.1%	20	33.9%	59	100.0%
P-ER5	39	66.1%	20	33.9%	59	100.0%
P-ER6	39	66.1%	20	33.9%	59	100.0%
P-ER7	39	66.1%	20	33.9%	59	100.0%
P-ER8	39	66.1%	20	33.9%	59	100.0%
P-ER9	39	66.1%	20	33.9%	59	100.0%
P-ER10	39	66.1%	20	33.9%	59	100.0%
P-ER11	39	66.1%	20	33.9%	59	100.0%
P-EV1	39	66.1%	20	33.9%	59	100.0%
P-EV2	39	66.1%	20	33.9%	59	100.0%
P-EV3	39	66.1%	20	33.9%	59	100.0%
P-EV4	39	66.1%	20	33.9%	59	100.0%
P-EV5	39	66.1%	20	33.9%	59	100.0%
P-EV6	39	66.1%	20	33.9%	59	100.0%
P-EV7	39	66.1%	20	33.9%	59	100.0%
P-EV8	39	66.1%	20	33.9%	59	100.0%
P-DE1	39	66.1%	20	33.9%	59	100.0%

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
P-DE2	39	66.1%	20	33.9%	59	100.0%
P-DE3	39	66.1%	20	33.9%	59	100.0%
P-DE4	39	66.1%	20	33.9%	59	100.0%
P-DE5	39	66.1%	20	33.9%	59	100.0%
P-DE6	39	66.1%	20	33.9%	59	100.0%
P-DE7	39	66.1%	20	33.9%	59	100.0%
P-DE8	39	66.1%	20	33.9%	59	100.0%

Report

	P-PR1	P-PR2	P-PR3	P-PR4	P-PR5	P-PR6	P-PR7
Mean	2.72	2.38	2.77	2.10	4.00	2.62	2.51
N	39	39	39	39	39	39	39
Std. Deviation	.456	.544	.536	.912	.725	.544	.683
Sum	106	93	108	82	156	102	98
Skewness	-1.008	-.031	-2.332	-.211	.000	-1.005	-1.092

Report

	P-PR8	P-PR9	P-PR10	P-ER1	P-ER2	P-ER3	P-ER4
Mean	4.44	3.74	3.28	4.41	2.79	3.41	3.82
N	39	39	39	39	39	39	39
Std. Deviation	.852	.498	.647	.498	.409	.498	.997
Sum	173	146	128	172	109	133	149
Skewness	-1.000	-.467	-.341	.380	-1.520	.380	.380

Report

	P-ER5	P-ER6	P-ER7	P-ER8	P-ER9	P-ER10	P-ER11
Mean	4.03	3.59	2.77	2.10	2.41	3.41	1.95
N	39	39	39	39	39	39	39
Std. Deviation	.778	.785	.427	.641	.498	.498	.647
Sum	157	140	108	82	94	133	76
Skewness	-.045	.890	-1.330	-.089	.380	.380	.046

Report

	P-EV1	P-EV2	P-EV3	P-EV4	P-EV5	P-EV6	P-EV7
Mean	2.41	2.41	3.41	2.41	2.41	2.77	1.95
N	39	39	39	39	39	39	39
Std. Deviation	.498	.498	.498	.498	.498	.427	.647
Sum	94	94	133	94	94	108	76
Skewness	.380	.380	.380	.380	.380	-1.330	.046

Report

	P-EV8	P-DE1	P-DE2	P-DE3	P-DE4	P-DE5	P-DE6
Mean	2.41	2.90	2.41	3.31	2.67	2.21	1.85
N	39	39	39	39	39	39	39
Std. Deviation	.498	.307	.498	.468	.478	.615	.630
Sum	94	113	94	129	104	86	72
Skewness	.380	-2.726	.380	.867	-.736	-.140	.122

Report

	P-DE7	P-DE8
Mean	2.79	1.62
N	39	39
Std. Deviation	.409	.747
Sum	109	63
Skewness	-1.520	.778

Appendix III: Means Value for Risk Impact on Cost

```
MEANS TABLES=CPR1 CPR2 CPR3 CPR4 CPR5 CPR6 CPR7 CPR8 CPR9 CPR10 CER1 CER2 CE
R3 CER4 CER5 CER6 CER7 CER8 CER9 CER10 CER11 CEV1 CEV2 CEV3 CEV4 CEV5 CEV6 C
EV7 CEV8 CDE1 CDE2 CDE3 CDE4 CDE5 CDE6 CDE7 CDE8
  /CELLS=MEAN COUNT SUM.
```

Means

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
C-PR1	39	66.1%	20	33.9%	59	100.0%
C-PR2	39	66.1%	20	33.9%	59	100.0%
C-PR3	39	66.1%	20	33.9%	59	100.0%
C-PR4	39	66.1%	20	33.9%	59	100.0%
C-PR5	39	66.1%	20	33.9%	59	100.0%
C-PR6	39	66.1%	20	33.9%	59	100.0%
C-PR7	39	66.1%	20	33.9%	59	100.0%
C-PR8	39	66.1%	20	33.9%	59	100.0%
C-PR9	39	66.1%	20	33.9%	59	100.0%
C-PR10	39	66.1%	20	33.9%	59	100.0%
C-ER1	39	66.1%	20	33.9%	59	100.0%
C-ER2	39	66.1%	20	33.9%	59	100.0%
C-ER3	39	66.1%	20	33.9%	59	100.0%
C-ER4	39	66.1%	20	33.9%	59	100.0%
C-ER5	39	66.1%	20	33.9%	59	100.0%
C-ER6	39	66.1%	20	33.9%	59	100.0%
C-ER7	39	66.1%	20	33.9%	59	100.0%
C-ER8	39	66.1%	20	33.9%	59	100.0%
C-ER9	39	66.1%	20	33.9%	59	100.0%
C-ER10	39	66.1%	20	33.9%	59	100.0%
C-ER11	39	66.1%	20	33.9%	59	100.0%
C-EV1	39	66.1%	20	33.9%	59	100.0%
C-EV2	39	66.1%	20	33.9%	59	100.0%
C-EV3	39	66.1%	20	33.9%	59	100.0%
C-EV4	39	66.1%	20	33.9%	59	100.0%
C-EV5	39	66.1%	20	33.9%	59	100.0%
C-EV6	39	66.1%	20	33.9%	59	100.0%
C-EV7	39	66.1%	20	33.9%	59	100.0%
C-EV8	39	66.1%	20	33.9%	59	100.0%

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
C-DE1	39	66.1%	20	33.9%	59	100.0%
C-DE2	39	66.1%	20	33.9%	59	100.0%
C-DE3	39	66.1%	20	33.9%	59	100.0%
C-DE4	39	66.1%	20	33.9%	59	100.0%
C-DE5	39	66.1%	20	33.9%	59	100.0%
C-DE6	39	66.1%	20	33.9%	59	100.0%
C-DE7	39	66.1%	20	33.9%	59	100.0%
C-DE8	39	66.1%	20	33.9%	59	100.0%

Report

	C-PR1	C-PR2	C-PR3	C-PR4	C-PR5	C-PR6	C-PR7	C-PR8
Mean	4.10	3.85	4.41	4.41	4.38	3.59	4.44	4.59
N	39	39	39	39	39	39	39	39
Sum	160	150	172	172	171	140	173	179

Report

	C-PR9	C-PR10	C-ER1	C-ER2	C-ER3	C-ER4	C-ER5	C-ER6
Mean	4.13	3.67	4.41	3.74	3.85	3.87	4.62	4.00
N	39	39	39	39	39	39	39	39
Sum	161	143	172	146	150	151	180	156

Report

	C-ER7	C-ER8	C-ER9	C-ER10	C-ER11	C-EV1	C-EV2	C-EV3
Mean	3.59	3.36	4.69	4.23	3.59	4.38	4.23	4.21
N	39	39	39	39	39	39	39	39
Sum	140	131	183	165	140	171	165	164

Report

	C-EV4	C-EV5	C-EV6	C-EV7	C-EV8	C-DE1	C-DE2	C-DE3
Mean	3.92	3.77	3.59	4.28	4.26	3.69	3.82	4.41
N	39	39	39	39	39	39	39	39
Sum	153	147	140	167	166	144	149	172

Report

	C-DE4	C-DE5	C-DE6	C-DE7	C-DE8
Mean	4.05	2.72	4.00	3.56	3.59
N	39	39	39	39	39
Sum	158	106	156	139	140

Appendix IV: Means Value for Risk Impact on Time

```
MEANS TABLES=TPR1 TPR2 TPR3 TPR4 TPR5 TPR6 TPR7 TPR8 TPR9 TPR10 TER1 TER2 TE
R3 TER4 TER5 TER6 TER7 TER8 TER9 TER10 TER11 TEV1 TEV2 TEV3 TEV4 TEV5 TEV6 T
EV7 TEV8 TDE1 TDE2 TDE3 TDE4 TDE5 TDE6 TDE7 TDE8
  /CELLS=MEAN COUNT SUM.
```

Means

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
T-PR1	39	66.1%	20	33.9%	59	100.0%
T-PR2	39	66.1%	20	33.9%	59	100.0%
T-PR3	39	66.1%	20	33.9%	59	100.0%
T-PR4	39	66.1%	20	33.9%	59	100.0%
T-PR5	39	66.1%	20	33.9%	59	100.0%
T-PR6	39	66.1%	20	33.9%	59	100.0%
T-PR7	39	66.1%	20	33.9%	59	100.0%
T-PR8	39	66.1%	20	33.9%	59	100.0%
T-PR9	39	66.1%	20	33.9%	59	100.0%
T-PR10	39	66.1%	20	33.9%	59	100.0%
T-ER1	39	66.1%	20	33.9%	59	100.0%
T-ER2	39	66.1%	20	33.9%	59	100.0%
T-ER3	39	66.1%	20	33.9%	59	100.0%
T-ER4	39	66.1%	20	33.9%	59	100.0%
T-ER5	39	66.1%	20	33.9%	59	100.0%
T-ER6	39	66.1%	20	33.9%	59	100.0%
T-ER7	39	66.1%	20	33.9%	59	100.0%
T-ER8	39	66.1%	20	33.9%	59	100.0%
T-ER9	39	66.1%	20	33.9%	59	100.0%
T-ER10	39	66.1%	20	33.9%	59	100.0%
T-ER11	39	66.1%	20	33.9%	59	100.0%
T-EV1	39	66.1%	20	33.9%	59	100.0%
T-EV2	39	66.1%	20	33.9%	59	100.0%
T-EV3	39	66.1%	20	33.9%	59	100.0%
T-EV4	39	66.1%	20	33.9%	59	100.0%
T-EV5	39	66.1%	20	33.9%	59	100.0%
T-EV6	39	66.1%	20	33.9%	59	100.0%
T-EV7	39	66.1%	20	33.9%	59	100.0%
T-EV8	39	66.1%	20	33.9%	59	100.0%
T-DE1	39	66.1%	20	33.9%	59	100.0%

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
T-DE2	39	66.1%	20	33.9%	59	100.0%
T-DE3	39	66.1%	20	33.9%	59	100.0%
T-DE4	39	66.1%	20	33.9%	59	100.0%
T-DE5	39	66.1%	20	33.9%	59	100.0%
T-DE6	39	66.1%	20	33.9%	59	100.0%
T-DE7	39	66.1%	20	33.9%	59	100.0%
T-DE8	39	66.1%	20	33.9%	59	100.0%

Report

	T-PR1	T-PR2	T-PR3	T-PR4	T-PR5	T-PR6	T-PR7	T-PR8
Mean	2.41	2.13	3.26	4.36	4.03	4.49	4.41	4.72
N	39	39	39	39	39	39	39	39
Sum	94	83	127	170	157	175	172	184

Report

	T-PR9	T-PR10	T-ER1	T-ER2	T-ER3	T-ER4	T-ER5	T-ER6
Mean	4.33	3.56	4.54	4.31	3.97	3.64	4.46	3.97
N	39	39	39	39	39	39	39	39
Sum	169	139	177	168	155	142	174	155

Report

	T-ER7	T-ER8	T-ER9	T-ER10	T-ER11	T-EV1	T-EV2	T-EV3
Mean	3.49	4.41	3.85	3.82	4.21	3.41	3.62	4.33
N	39	39	39	39	39	39	39	39
Sum	136	172	150	149	164	133	141	169

Report

	T-EV4	T-EV5	T-EV6	T-EV7	T-EV8	T-DE1	T-DE2	T-DE3
Mean	2.38	2.05	2.41	3.41	3.10	4.36	2.72	4.41
N	39	39	39	39	39	39	39	39
Sum	93	80	94	133	121	170	106	172

Report

	T-DE4	T-DE5	T-DE6	T-DE7	T-DE8
Mean	2.67	4.10	2.79	2.59	3.82
N	39	39	39	39	39
Sum	104	160	109	101	149

Appendix VI: Means Value for Risk Impact on Safety

```
MEANS TABLES=SPR1 SPR2 SPR3 SPR4 SPR5 SPR6 SPR7 SPR8 SPR9 SPR10 SER1 SER2 SE
R3 SER4 SER5 SER6 SER7 SER8 SER9 SER10 SER11 SEV1 SEV2 SEV3 SEV4 SEV5 SEV6 S
EV7 SEV8 SDE1 SDE2 SDE3 SDE4 SDE5 SDE6 SDE7 SDE8
  /CELLS=MEAN COUNT SUM.
```

Means

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
S-PR1	39	66.1%	20	33.9%	59	100.0%
S-PR2	39	66.1%	20	33.9%	59	100.0%
S-PR3	39	66.1%	20	33.9%	59	100.0%
S-PR4	39	66.1%	20	33.9%	59	100.0%
S-PR5	39	66.1%	20	33.9%	59	100.0%
S-PR6	39	66.1%	20	33.9%	59	100.0%
S-PR7	39	66.1%	20	33.9%	59	100.0%
S-PR8	39	66.1%	20	33.9%	59	100.0%
S-PR9	39	66.1%	20	33.9%	59	100.0%
S-PR10	39	66.1%	20	33.9%	59	100.0%
S-ER1	39	66.1%	20	33.9%	59	100.0%
S-ER2	39	66.1%	20	33.9%	59	100.0%
S-ER3	39	66.1%	20	33.9%	59	100.0%
S-ER4	39	66.1%	20	33.9%	59	100.0%
S-ER5	39	66.1%	20	33.9%	59	100.0%
S-ER6	39	66.1%	20	33.9%	59	100.0%
S-ER7	39	66.1%	20	33.9%	59	100.0%
S-ER8	39	66.1%	20	33.9%	59	100.0%
S-ER9	39	66.1%	20	33.9%	59	100.0%
S-ER10	39	66.1%	20	33.9%	59	100.0%
S-ER11	39	66.1%	20	33.9%	59	100.0%
S-EV1	39	66.1%	20	33.9%	59	100.0%
S-EV2	39	66.1%	20	33.9%	59	100.0%
S-EV3	39	66.1%	20	33.9%	59	100.0%
S-EV4	39	66.1%	20	33.9%	59	100.0%
S-EV5	39	66.1%	20	33.9%	59	100.0%
S-EV6	39	66.1%	20	33.9%	59	100.0%
S-EV7	39	66.1%	20	33.9%	59	100.0%
S-EV8	39	66.1%	20	33.9%	59	100.0%
S-DE1	39	66.1%	20	33.9%	59	100.0%

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
S-DE2	39	66.1%	20	33.9%	59	100.0%
S-DE3	39	66.1%	20	33.9%	59	100.0%
S-DE4	39	66.1%	20	33.9%	59	100.0%
S-DE5	39	66.1%	20	33.9%	59	100.0%
S-DE6	39	66.1%	20	33.9%	59	100.0%
S-DE7	39	66.1%	20	33.9%	59	100.0%
S-DE8	39	66.1%	20	33.9%	59	100.0%

Report

	S-PR1	S-PR2	S-PR3	S-PR4	S-PR5	S-PR6	S-PR7	S-PR8
Mean	1.51	4.59	4.59	3.59	3.54	3.67	4.56	3.77
N	39	39	39	39	39	39	39	39
Sum	59	179	179	140	138	143	178	147

Report

	S-PR9	S-PR10	S-ER1	S-ER2	S-ER3	S-ER4	S-ER5	S-ER6
Mean	3.51	3.67	4.69	4.13	4.69	4.77	3.33	4.77
N	39	39	39	39	39	39	39	39
Sum	137	143	183	161	183	186	130	186

Report

	S-ER7	S-ER8	S-ER9	S-ER10	S-ER11	S-EV1	S-EV2	S-EV3
Mean	4.41	3.69	4.69	4.62	3.67	4.85	4.72	3.56
N	39	39	39	39	39	39	39	39
Sum	172	144	183	180	143	189	184	139

Report

	S-EV4	S-EV5	S-EV6	S-EV7	S-EV8	S-DE1	S-DE2	S-DE3
Mean	4.13	4.05	4.59	4.74	4.67	4.41	4.77	3.41
N	39	39	39	39	39	39	39	39
Sum	161	158	179	185	182	172	186	133

Report

	S-DE4	S-DE5	S-DE6	S-DE7	S-DE8
Mean	4.41	3.46	4.54	4.69	3.38
N	39	39	39	39	39
Sum	172	135	177	183	132