Project risk response success

An empirical study on project risk response success factors in the construction industry of Sweden

Authors: Rehab Iftikhar  
Suneeta Menon

Supervisor: Per Nilsson

Student  
Umeå School of Business  
Autumn semester 2011  
Master thesis, two-year, 30 hp  
Date: 2011-12-02
Dedication

Dedicated to Our Creator, our family, friends and teachers

- Who bestowed on us the meaning of life- the purpose
- Who furnished us with a vision to make the difference- the mission
- Who granted us a wealth of knowledge, love and respect to share with my fellow beings
- Who blessed us with a family to love and support
- Who bequeathed us with caring friends to encourage
- Who coached and inspired us whenever we were low
Acknowledgement

We would like to thank our supervisor Per Nilsson for his dedication and worthwhile guidance throughout our thesis. His experience and valuable advice has contributed much to this paper.

Successful completion of this study owes immense indebtedness to many personalities and sources.

Rehab: My special thanks to my parents, Mirza Iftikhar Ali Baig and Tasleem Akhtar for their appreciation and for all those nights they spent praying for me; my brothers, Mohsin Iftikhar and Mudassar Iftikhar for their constant support and inspiration; my sister-in-law, Humaira Mohsin for her encouragement and trust on me; my sister, Fareha Tirmizi for her moral support and affection; my teachers, Catherine Lions and Nayyer Kazmi for believing on my abilities and to whom I have learnt a lot; all my friends specially, Amina Bashir, Zara Pervaiz, Misbah Asharaf and Sandhiya Goolaup for their care and unwavering support and all others whose appreciation gave me confidence to made me able to write this thesis.

Suneeta: My heartfelt gratitude goes to my husband, Kishore, who has been of immense support to me throughout my studies leading to this Master thesis. Thank you for your love, care and concern. I could not have done this without you! Special thanks goes to my family- my parents, my parents-in-law, my sister, Sudha, her husband, Andreas, and my brother-in-law, Ashok, for all your help, understanding and encouragement. You have always been there for me. I would also like to thank all my friends who have taken care of me and helped me in one way or other, and have indeed made my journey during the writing of this thesis a memorable one.
Abstract

Risk is everywhere and it is something which we face in everyday life. Same is the case with projects. Projects are complex and risks are inherent in projects. It is not unusual for unexpected events to occur and for uncertainty to emerge in projects. These events contribute to project risks which require to be dealt with so that projects could continue to run effectively. The need for good project risk management is therefore especially important as it could determine the success of the project or otherwise. However, research on the factors that make project risk response successful has been neglected. Contemporary researchers focused on risk management phases other than risk response. Our main focus in this paper is to indicate determinants of project risk response success and their relative importance in the construction industry of Sweden. The construction industry is considered as construction projects are not only important but they identify tangibly with the physical outputs of projects and exemplify the uncertainty and risks that are present in this type of projects. Sweden is chosen as the context of our study owing to the immense contributions of the construction sector towards the country’s growth and GDP. On the basis of extensive literature review, we have come up with the determinants for project risk response success and developed a proposed conceptual model.

A quantitative study is undertaken with the administration of questionnaires. The empirical data is gathered from project managers in the construction industry of Sweden for this purpose. Project managers are selected as respondents as they would be the ones controlling and managing projects, along with responding to the various risks subjected to in projects. Hypotheses have been generated for this research and the results are analyzed to determine if these hypotheses are to be accepted or rejected. For data analysis, SPSS is used. The results are drawn by the use of statistical tools like ANOVA, correlation and t-tests. These outcomes will lead to the conclusion of our study as to what the factors are that determine project risk response success and their relative importance. A revised conceptual model is finally developed to address the findings of our research. This research found a set of seven success factors which can be used as a guideline for project risk response success. These factors are (1) Team competency and skills, (2) Effective communication, (3) Active leadership, (4) Negotiation and coordination, (5) Hierarchical structure, (6) Behaviour and (7) Empowerment. These determinants of project risk response success can be generalized to the construction industry in Sweden.

Keywords: project risk, project risk management, uncertainty, unexpected events, risk response, construction industry
# Table of contents

1. **Introduction** .................................................................................................................. 1  
   1.1 Background .................................................................................................................. 1  
   1.2 Knowledge gap and expected contributions................................................................. 3  
   1.3 Research questions ..................................................................................................... 4  
   1.4 Research objective ..................................................................................................... 4  
   1.5 Delimitation ................................................................................................................. 5  
   1.6 Disposition .................................................................................................................. 7  

2. **Theoretical Methodology** ............................................................................................. 9  
   2.1 Choice of Subject ........................................................................................................ 9  
   2.2 Literature selection ...................................................................................................... 9  
   2.3 Critical review of source ............................................................................................. 10  
   2.4 Researchers’ preconceptions ....................................................................................... 10  
   2.5 Research onion ........................................................................................................... 11  
   2.6 Research philosophy .................................................................................................. 12  
      2.6.1 Ontological considerations ................................................................................... 12  
      2.6.2 Epistemological considerations ......................................................................... 13  
   2.7 Research approach ..................................................................................................... 14  
      2.7.1 Deductive approach ............................................................................................ 16  
   2.8 Research design .......................................................................................................... 16  
      2.8.1 Research purpose ............................................................................................... 16  
      2.8.2 Research strategy ............................................................................................... 18  
      2.8.3 Research method ............................................................................................... 19  
      2.8.4 Time horizon ...................................................................................................... 20  

3. **Literature review** ......................................................................................................... 22  
   3.1 Literature framework ................................................................................................... 22  
   3.2 Project and risk .......................................................................................................... 23  
      3.2.1 Project .................................................................................................................. 23  
      3.2.2 Project objectives / constraints .......................................................................... 23  
      3.2.3 Risk ...................................................................................................................... 23  
      3.2.4 Risk classification .............................................................................................. 24  
      3.2.5 Level and severity of risk ................................................................................... 25  
      3.2.6 What risk to take and to avoid .......................................................................... 25  
      3.2.7 Risk breakdown structure (RBS) ........................................................................ 26
3.3 Project management vs. risk management ................................................................. 28
  3.3.1 Importance of risk management in projects .......................................................... 29
  3.3.2 Risk management: Proactive vs. reactive ............................................................ 30
  3.3.3 Effective risk management process in projects ..................................................... 30

3.4 Risk response ............................................................................................................. 31
  3.4.1 Reason for poor risk management and risk response ............................................. 32
  3.4.2 Fundamental for risk response success association with organizational practices ... 32

3.5 Project manager’s role .............................................................................................. 34

3.6 Construction industry ............................................................................................... 35

3.7 Risk management in construction industry .............................................................. 36

3.8 Sweden’s Construction industry ............................................................................... 37

3.9 Unexpected events and types of uncertainty ............................................................ 37

3.10 Lesson learned from unexpected events, uncertainty and risk ................................ 38

3.11 Proposed conceptual model ..................................................................................... 43
  3.11.1 Explanation of conceptual model ........................................................................ 44

3.12 Dependent variable ................................................................................................. 45
  3.12.1 Project risk response success ............................................................................. 45

3.13 Independent variables ............................................................................................ 45
  3.13.1 Effective communication ................................................................................... 45
  3.13.2 Active leadership ............................................................................................... 46
  3.13.3 Negotiation and coordination ............................................................................. 47
  3.13.4 Team competency and skills ............................................................................. 48
  3.13.5 Hierarchical structure ....................................................................................... 50
  3.13.6 Empowerment .................................................................................................. 51
  3.13.7 Behaviour ......................................................................................................... 51

3.14 Condition for hypothesis testing ............................................................................. 52

3.15 Intervening variables .............................................................................................. 53
  3.15.1 Openness to opinion ......................................................................................... 53
  3.15.2 Trust and confidence ......................................................................................... 53
  3.15.3 Training and education ..................................................................................... 53

4. Practical methodology ................................................................................................. 54
  4.1 Research design process ......................................................................................... 54
  4.2 Research sample ..................................................................................................... 56
  4.3 Sampling techniques ............................................................................................... 56
4.4 Sample size ................................................................. 57
4.5 Respondents ................................................................. 58
4.6 Data collection tools (Questionnaire) ........................................ 58
4.7 Survey procedure ............................................................. 59
4.8 Processing and analysis of data ............................................... 60
4.9 Quality criteria ................................................................. 60
  4.9.1 Reliability and validity of research .................................... 60
  4.9.2 Generalizability of research ........................................... 60
4.10 Ethical consideration .......................................................... 61

5. Data analysis, findings and result discussion ................................. 62
  5.1 Descriptive statistics ....................................................... 62
  5.2 Demographic information .................................................. 62
    5.2.1 Gender ................................................................. 62
    5.2.2 Age .................................................................. 63
    5.2.3 Experience in project management field ................................. 64
  5.3 Inferential statistics .......................................................... 65
    5.3.1 ANOVA ................................................................. 66
    5.3.2 Correlation .............................................................. 66
    5.3.3 Reliability .............................................................. 66
  5.4 Independent variables’ relationship with dependent variable ........... 66
    5.4.1 Testing of effective communication .................................. 67
    5.4.2 Testing of active leadership .......................................... 68
    5.4.3 Testing of negotiation and coordination ............................... 70
    5.4.4 Testing of team competency and skills ............................... 72
    5.4.5 Testing of hierarchical structure .................................... 73
    5.4.6 Testing of empowerment ............................................. 75
    5.4.7 Testing of behaviour ................................................ 76
  5.5 Helicopter view ............................................................... 78
    5.5.1 Analysis of variance (ANOVA) ...................................... 78
    5.5.2 Correlation (Multiple-item scale) .................................... 78
    5.5.3 Reliability of questionnaire and scales ............................... 79
  5.6 Intervening variables’ relationship with independent and dependent variables ................................. 80
    5.6.1 Testing of trust and confidence ...................................... 80
    5.6.2 Testing of openness to opinion ...................................... 81
5.6.3 Testing of training and education ................................................... 81
5.7 Relative importance of independent variables ................................................... 82
5.7.1 One-sample t-test on independent variables ................................................... 82
5.7.2 Relative importance index (RII) ................................................... 84
5.7.3 Helicopter view-Ranking of independent variables ................................................... 85
5.8 Result discussion ................................................................................... 85
5.8.1 Independent variable-Team competency and skills ................................................... 85
5.8.2 Independent variable-Effective communication ................................................... 86
5.8.3 Independent variable-Active leadership ................................................... 86
5.8.4 Independent variable-Negotiation and coordination ................................................... 86
5.8.5 Independent variable-Hierarchical structure ................................................... 86
5.8.6 Independent variable-Behaviour ................................................... 86
5.8.7 Independent variable-Empowerment ................................................... 86
5.8.8 Intervening variable-Trust and confidence ................................................... 87
5.8.9 Intervening variable-Openness to opinion ................................................... 87
5.8.10 Intervening variable-Training and education ................................................... 87
5.9 Revised conceptual model ........................................................................... 88
6. Conclusions and recommendations ........................................................... 90
6.1 Conclusion ............................................................................................ 90
6.2 Theoretical implications ........................................................................ 91
6.3 Practical implications ............................................................................ 91
6.4 Methodological implications ................................................................ 92
6.5 Future research .................................................................................... 92
References ................................................................................................. 94
Appendix A ............................................................................................... 100
List of figures

**Figure 1:** Disposition snapshot of our research ...............................................................8
**Figure 2:** Research onion ..............................................................................................12
**Figure 3:** The deduction process .....................................................................................15
**Figure 4:** The induction process .....................................................................................15
**Figure 5:** Literature framework ....................................................................................22
**Figure 6:** Risk breakdown structure ..............................................................................28
**Figure 7:** Focus of the research .....................................................................................38
**Figure 8:** Three pillars to successful response to unexpected events .........................39
**Figure 9:** Proposed conceptual model ...........................................................................43
**Figure 10:** Research design process ................................................................................55
**Figure 11:** Scatter diagram of Effective communication .............................................68
**Figure 12:** Scatter diagram of Active leadership ........................................................70
**Figure 13:** Scatter diagram of Negotiation and coordination ........................................71
**Figure 14:** Scatter diagram of Team competency and skills ........................................73
**Figure 15:** Scatter diagram of Hierarchical structure ...................................................74
**Figure 16:** Scatter diagram of Empowerment ...............................................................76
**Figure 17:** Scatter diagram of Behaviour ......................................................................77
**Figure 18:** Revised conceptual model ............................................................................88

List of tables

**Table 1:** Common contrasts between qualitative and quantitative methods ..................20
**Table 2:** Literature on practices related to unexpected events ........................................40
**Table 3:** Questionnaire and response rate attained ..........................................................59
**Table 4:** Demographics by gender ..................................................................................63
**Table 5:** Demographics by age .....................................................................................64
**Table 6:** Demographics by experience in project management .......................................65
**Table 7:** F ratio of Effective communication ....................................................................67
**Table 8:** Correlation value of Effective communication ................................................67
**Table 9:** F ratio of Active leadership .................................................................................69
**Table 10:** Correlation value of Active leadership ..............................................................69
**Table 11:** F ratio of Negotiation and coordination ............................................................70
**Table 12:** Correlation value of Negotiation and coordination .........................................71
Table 13: F ratio of Team competency and skills ................................................................. 72
Table 14: Correlation value of Team competency and skills ............................................. 72
Table 15: F ratio of Hierarchical structure ........................................................................... 73
Table 16: Correlation value of Hierarchical structure ........................................................... 74
Table 17: F ratio of Empowerment ...................................................................................... 75
Table 18: Correlation value of Empowerment ..................................................................... 75
Table 19: F ratio of Behaviour ............................................................................................ 76
Table 20: Correlation value of Behaviour ............................................................................ 77
Table 21: Helicopter view of F ratios ................................................................................... 78
Table 22: Helicopter view of Correlation values ................................................................. 78
Table 23: Reliability of questionnaire’s scales ...................................................................... 79
Table 24: Reliability of variables’ scales .............................................................................. 79
Table 25: Correlation of Trust and Confidence ..................................................................... 80
Table 26: Correlation of Openness to opinion ...................................................................... 81
Table 27: Correlation of Training and education ................................................................. 81
Table 28: One sample t-test of independent variables ......................................................... 82
Table 29: Ranking of independent variables ......................................................................... 83
Table 30: Helicopter view of relative importance of independent variables ...................... 85
Table 31: Ranking of relative importance of independent variables ................................... 85
1. Introduction
The introduction chapter aims to guide the reader through the background of the thesis by reviewing previous research. Problem discussion, the research questions, purpose and delimitations of the study are part of this chapter. The chapter concludes with a thesis disposition.

1.1 Background
The Titanic was considered the perfect ship for passengers but what happened on 14th April 1912 was unthinkable to the world. The ship hit an iceberg (an unexpected event) and the uncertainty as to the extent of the collision that the ship could withstand arose. This impact created a risk to both the passengers and the crew. Despite its strong structure, the Titanic eventually sank which caused a great human loss. The unexpected happened, leading to an uncertain situation which in turn created a risk. Even if hitting an iceberg could have been expected, no one expected the ship to sink as its structure was thought to be sturdy enough. There was no preparation to deal with such an incident if it happened and therefore, the staff was ill-equipped to manage that risk. Had they been more prepared, they could have tried taking preventive measures to avoid hitting the iceberg. Hence, the project to build the largest passenger ship in the world was met with a fatal outcome arising from the occurrence of an unexpected event. (Geraldi, Lee-Kelley & Kutsch, 2009, p. 547)

Moving on to a more recent example to illustrate risks in projects, the Beijing Olympics Stadium is considered. The remarkable, state-of-the-art stadium in China is one of the world’s most sophisticated stadiums. The construction of the stadium was carried out to prepare for the 29th Olympic Games, hosted by Beijing in 2008. The construction of the stadium faced several unexpected events. Disputes arose between the project companies’ private and public partners, the financial viability of the stadium was undermined and there were re-negotiations in design contracts, which eventually led to the cancellation of the stadium’s retractable roof that had been planned for. The risks of cost over-runs, technical issues and delays in construction were immense and it was uncertain if the construction of the stadium could meet the project objectives. Eventually, these risks were well managed and the project was a huge success. The construction of China’s National Stadium was completed in time with a high quality and reasonable cost. This resulted in a spectacular infrastructure which was witnessed by the world during the 2008 Beijing Olympic Games. Despite the uncertainties and the many risks involved in the construction of the stadium, the management of these risks in the project proved to be successful. (Liu, Zhao & Wang, 2010)

Although the Titanic incident was disastrous whereas the construction of the Beijing Olympics Stadium was a success, there are similarities between them. Both are projects that faced unexpected situations or uncertainties, whether during or after construction. Risk played a major role in both these instances. This extends to other projects as well, where risk is a common element that exists in projects in general. Even though projects may be well planned and organized, within any stage of a project, the unexpected can happen. Moreover, there is an element of uncertainty, and in turn risk, carried along with the uniqueness of each project. If there is no proper management of risk, there could be adverse consequences. It could result in the damage of reputation of project based organizations, unsatisfactory relationships with the various stakeholders or unhappy clients and sponsors. (PMI, 2004; Jaafari, 2001; Maylor, 2005)
Not all risks can be foreseen or predicted. Since such risks cannot be defined in advance, this leads to question how effective project risk management can be. Nevertheless, risk management is an essential component of good management and decision making. Projects fail to achieve their objectives due to the occurrence of something unexpected. Hence, risk management guides projects in achieving their objectives. The need for good project risk management is therefore vital. As a definition, “risk management is a systematic approach to setting the best course of action under uncertainty by identifying, assessing, understanding, acting on and communicating risk issues, i.e. risk management is a process that addresses uncertainty”. (Frigueiredo & Kitson, 2009, p. 08.2)

There are two broad categories of risks found in projects: strategic risk and operational risk. Strategic risks are not of particular interest to the project team and project managers as these risks are out of the scope of project responsibility. Operational risk, on the other hand, is paid more attention to by project teams and project managers since such risks are within their control. As such, project teams and managers have the ability to tackle operational risks. (Krane, Rolstadås & Olsson, 2010, p. 82) With this in mind, our paper will mainly focus on operational risks as we can get the input of project managers who are able to control such risks. Moreover, projects contain almost 90% of operational risk while traditional risk management deals with mostly strategic risks and neglects operational risk to a large extent (Krane et al., 2010, p. 84-85). This adds to our motivation of discussing operational risks as it is this type of risk that is mainly subjected in projects.

In addition, it is the project managers who handle operational risks which are within their control, and for that reason, our research will focus on project managers. Furthermore, it is appropriate to study project managers as they are the ones who manage and control the project with the project team in order to achieve project goals. Hence, the role of the project manager is the executor of the project as a whole. (PMBOK 2000, 2004) Thus, risks in projects would be managed and controlled by project managers.

Within the area of project risk management, the risk response phase is of particular interest to us. There is a lack of literature found on risk response and we would like to study this area to make a further contribution to knowledge in this field. As aforementioned, risk is highly related to uncertainty and the occurrence of unexpected events. Due to the inter-connectedness of the various terms, we have used the words “risk”, “uncertainty” and “unexpected events” interchangeably. We are aware that these terms in actuality could mean different things. However, for the purpose of simplicity and to aid understanding in this paper, we have drawn parallels among these terms since they are very closely related. For instance, when we mention “response to risk”, it will be taken to mean “response to uncertainty” or “response to unexpected events” as well.

The construction industry has been selected in our research because “virtually everyone can identify its outputs and its tenure” (Hällgren & Wilson, 2008, p. 831). We wanted to study an industry that is very typical of having projects, and construction projects are an obvious choice with their temporary nature and physical outcomes. Furthermore, the construction industry is one of the biggest industries in the world and contributes to around one-tenth of the global GDP
Having stated our motivations for studying the construction industry, we have specifically focused our research on the construction industry within Sweden. There are several reasons for this choice. The construction industry in Sweden contributes to 8% of Sweden’s total GDP and has a yearly investment of 252.5 billion (SEK). Moreover, it is a growing industry with the highest GDP growth among all the sectors in Sweden. This industry also consists of approximately 320,000 employees. (Swedish construction federation, 2009) These statistics therefore indicate the importance of the construction industry in Sweden. In addition, for feasibility and easy access of data in conducting our research, we have selected to contact construction companies only in Sweden. Through these companies, we have contacted project managers who will provide us the data required for our study.

Several studies have been done on how project managers cope with unexpected occurrences. For example, research on crisis management in the construction industry (Hällgren & Wilson, 2008; Loosemore, 1998; Söderholm, 2008, p. 82) where project managers’ behaviours in unexpected conditions as well as the practices adopted by project managers to respond to crises were studied. As for the work conducted by Geraldi, Lee-Kelley & Kutsch (2009), contributions were made to the types of conditions residing within organizations that enabled project managers to respond successfully to unexpected events, with success being determined from the perceptions of project managers themselves. As per their findings, three pillars that characterized perceived successful responses to unexpected events were established: a responsive and functioning structure at the organizational level, good interpersonal relationship at the group level, and competent people at the individual level. Although these studies were concerned with more critical events (crises), our aim is to include a broader spectrum of occurrences that include the element of unexpectedness and uncertainty. Such events may or may not translate into crises but they would contain some extent of risk.

1.2 Knowledge gap and expected contributions

The risk response phase is an important yet understudied area in which project managers have to decide what to do when risk occurs. Even though project managers sacrifice much of their time and cost in responding to risks, risk response planning is a neglected part of project risk management (Syedhosîni, Noori & Hatefi, 2009, p. 753). There is a lack of studies that investigate the relationship between risk response practices and their success in responding to risks. Hence, there is a need to develop tools, techniques and behaviour processes for risk response success. According to Hällgren & Wilson (2011), there are applications of various tools and techniques in managing project risk but there is a lack of research focusing on risk response success. Models and frameworks (PMBoK, 2004) have been developed to study risk identification, risk assessment and risk analysis. However a risk response model and framework, in particular the factors that make risk response a success, is yet to be established (Hällgren & Wilson, 2011, p. 9-11).

The work of Geraldi, Lee-Kelley & Kutsch (2009) has identified the determinants of successful risk response in projects. We have not found any other prior research that had established success factors of risk response. The authors (ibid) had conducted their research in the form of a
qualitative study comprising of interviews with project managers from defence and defence-related organizations. However, response success factors may vary from industry to industry. Factors that could work well in the defence companies may (or may not) apply to construction companies due to their different natures which may call for different response requirements. It is not known what the project risk response success factors are in the construction industry, specifically in the context of Sweden. Hence, there is a gap in this knowledge area.

In addition, a methodological gap in quantitative research exists as well pertaining to risk response success factors. Since there was only one such study that we know of that was carried out in this field, there is no generalizability for the authors’ (ibid) findings to a larger population which can otherwise be possible in quantitative research. Thus, there is an opportunity here for us to address this gap.

Moreover, in the defence industry, the authors (ibid) indicated that a combination of all three pillars (a responsive and functioning structure at the organizational level, good interpersonal relationship at the group level and competent people at the individual level) is required to get a successful response to an unexpected event. However, what is missing in this area of knowledge is that there is no acknowledgement of the relative importance of these three pillars (and their respective constructs) in guiding project managers to successful response. This has highlighted yet another gap whereby the relative importance of determinants of successful risk response is unknown.

1.3 Research Questions
In view of the aforementioned research gaps, we intend to study pre-identified constructs within the defence industry of successful project risk response. We will test these constructs to see if they apply to the construction industry as well, focusing the context of our study to Sweden. We would also like to know how important these constructs are. In our research, we are seeking to find these answers that enable us to generalize our findings to the whole of the construction sector in Sweden. Therefore, our research questions would be as follows:

(i) What are the determinants of project risk response success in the construction industry of Sweden?

(ii) How important are the determinants of project risk response in the construction industry of Sweden?

These research questions will guide us in the formulation of hypotheses which will be done at the end of literature review stage. Subsequently, we would test hypotheses to arrive at our findings which will be illustrated in the data analysis section.

1.4 Research Objectives
The purpose of this research is twofold; one is to give a theoretical contribution to the project management body of knowledge and the other is to give a practical guide to project managers within the construction industry. Our objectives are to (1) investigate the factors associated with project risk response success, to (2) investigate the relative importance of these factors and to (3) develop a framework and model for project risk response success. The eventual identification of
important project risk response success factors in the construction industry will aid us in developing a suitable project risk response model and framework. This would be applicable to both project management knowledge area in terms of theory (since risk response is an understudied phenomenon), as well as to construction project managers in a practical sense, since it can guide and help them towards successful risk response to unexpected or uncertain occurrences in their projects.

Risk response success gives organizations the ability to cope with uncertainty and is thus an important tool in project risk management. It is natural that when risk or/and uncertainty arise, it creates discomfort and pressure in organizations. This is because project sponsors and clients want the projects to run as smoothly as possible to completion without compromising on project objectives like time, cost and quality. It may be difficult for organizations to plan for unexpected events and control uncertain situations. However, with our research contributions, it could be possible for organizations to respond to risk successfully, while still meeting daily requirements of the project and not compromising on project performance. Hence, organizations, and in particular project managers, can make use of the knowledge gained from this study to apply in their risk management planning. Since the emphasis of this paper is on the construction industry in Sweden, construction project managers especially will be able utilize these tools as a guide to ensure that relevant factors are put into place to be able to respond successfully to project risks. We wanted to focus on risk response to unexpected or uncertain events and not limit our research to response to crises alone. Nevertheless, we have included literature on crisis management as we believe that they have some valuable input to our study and could be applicable to project risk management as well.

1.5 Delimitations

Our study is meant to aid successful project risk management response. Response success to uncertainty or unexpected events will vary between different industries and even between different projects within any particular industry. As our focus is on the construction industry, we cannot imply that our results would extend to other industries as well. For instance, an IT project or an R&D project could have different requirements for risk response success as compared to that of construction projects. Even within the construction industry, a risk that arises from an unexpected situation concerning, for example, a road maintenance project may need to be responded to in a different manner than that pertaining to the building of a shopping centre.

The size and extent of the project could also matter as to what types of responses to risk are deemed successful. For instance, factors that may be critical for massive projects may not be considered as important for small-scale projects. In our research, we have not specifically chosen to study risk responses in relation to projects of a certain size or extent. However, we have contacted 50 big construction companies in Sweden. This goes to say that our research therefore excludes the remaining smaller construction companies in Sweden. These companies are contacted in order to access project managers from whom we will collect data.

Another delimitation concerns culture and nationality. Response success or even the extent of importance of these factors may not be considered similarly across different cultures and nationalities. Thus, we are not able to ascertain if our findings would similarly apply to the construction industry outside of Sweden.
In addition, there are various risks inherent in projects, and response success could also vary between these different types of risk. It would not be feasible for us to put forth the numerous types of risks and the factors which are important to the success of risk response pertaining to these risks. Thus in our study, we have not asked our respondents to answer questions regarding any specific uncertainty or unexpected situation that we have stated. Rather, we have given the opportunity to our respondents to respond according to their experiences with unexpected events or uncertainty that have arisen in their projects. Therefore, the results on success factors to risk response would not apply across the board to cover all types of project risk.

The factors that have been pre-determined in the defence industry as stated by Geraldi, Lee-Kelley & Kutsch (2009) will be used as the main basis for testing in the construction industry of Sweden. As we have not found any other literature as yet that have studied the factors that enable risk response to be successful, we had to rely on this single source for our core determinants of risk response success. This could be seen by critics as being too narrow a source to derive at the factors. However, this source of information is highly credible and valuable since it is a research that has been peer-reviewed and published in a highly commendable and well-known journal-International Journal of Project Management. Also, the high validity of this study has driven us to use this existing research and theories in order to derive at our hypotheses containing the same pre-determined variables and testing them. There were no other industries that we could have used as a yardstick in order to test the applicability of these same factors in Sweden’s construction industry. However, we have utilized other sources of information and integrated them into our study to make our research more holistic, for eg., the importance of risk response, the valuable contributions of Sweden’s construction industry, other factors that could have mediating effects on the core determinants (intervening factors), etc. Despite the relatively narrow source, we find the information reliable nevertheless.

Furthermore, we need to qualify that ‘success’ is a matter of perception. In our research, we are concerned about perceived risk response success. The limitation lies in individual perception and one’s response to risk occurring from unexpected events or uncertainty in the project environment. The definition of risk response success can differ from individual to individual. As such, we cannot state that our findings apply to actuality; they will be based on perceptions. We have selected to conduct our study from the perspective of project managers since they are responsible for the overall project and will be in the best position to answer our research questions. Hence, our findings are derived from the responses of project managers only, and not to other parties who may be involved in the project.

Finally, risk response success to unexpected events or uncertainty may not necessarily lead to project success as a whole. Project success is dependent on many other factors that may not be included within the risk response success framework. Project success factors are out of scope in this paper as our purpose is directed towards determinants of project risk response success. In view of this, we cannot imply that risk response success will in fact determine overall project success, although the former may contribute to some extent to the latter.
1.6 Disposition
The introductory chapter guides the reader through the background and problem discussion of our research, subsequently leading to the research questions, purpose and delimitations of the study. The second chapter concerns the theoretical methodology adopted for our research. It considers the scientific underpinnings and methodological approach that is best suited to our study. The third chapter is on our literature review which discusses the literature and prior research related to our topic. This chapter includes the literature framework and its relevant theories, as well as proposed conceptual model which further explains the variables that we have used and the hypotheses that we have derived at. The fourth chapter deals with the practical methodology that we have utilized, consisting of the research process design and details on the population, sample, respondents and data collection tools. The ethical considerations, reliability and validity of our research are also discussed here. This is followed by the fifth chapter on data analysis, findings and results discussion. Both descriptive and inferential statistics are undertaken and the findings are derived, leading to the revised conceptual model. The final chapter concludes our study with key findings, the theoretical, practical and methodological implications as well as areas for future research. A snapshot of the disposition of our paper is illustrated in Figure 1 as follows.
<table>
<thead>
<tr>
<th>Component</th>
<th>Content</th>
</tr>
</thead>
</table>
| Introduction                      | • Background and problem discussion  
• Research questions and purpose  
• Limitations of the study       |
| Theoretical methodology           | • Choice of subject, literature selection and critical review of sources  
• Researchers’ preconceptions, research onion, research approach and research philosophy  
• Research purpose and research design |
| Literature review                 | • Literature framework and related theories  
• Proposed conceptual model, its explanation and driven hypotheses from it |
| Practical methodology             | • Research process design  
• Research sample, sampling technique, sample size, respondents and data collection tools  
• Reliability and validity of data and ethical considerations |
| Data analysis, findings and results discussion | • Descriptive and inferential statistics  
• Results discussion and findings  
• Revised conceptual model |
| Conclusion and recommendations    | • Conclusion  
• Practical, theoretical and methodological implications  
• Future research |

**Figure 1: Disposition Snapshot of our research**
2. Theoretical Methodology
This chapter explains the theoretical methodological approach to the research questions and purpose of the thesis. The chapter starts with the choice of subject, literature selection, critical review of sources, researchers’ preconceptions, research approach, research philosophy and research design that is undertaken in our study. It continues with research purpose, strategy, method and time horizon suited to our study and explains the quantitative method that we have adopted.

2.1 Choice of subject
The inspiration to work on this topic comes from flood disasters that struck Pakistan (2010) and Australia (2011) and the earthquake in New Zealand (2011). These disasters affect countries and their industries on a large scale. With such disasters, risks and uncertainty are inevitable. This has motivated us to work on the areas of risk and uncertainty. Also, from the start, we are interested in the field of project management. Hence, we have decided to combine these two areas. When we explored the topic of project management in-depth, we found that there lies therein a specific area of risk management. From there, we have chosen to link uncertain events with projects and project risks. We started reading available material on this topic in order to find an area yet to be studied that would enable us to make both theoretical and practical contributions. In the process, we found that risk response within project management has not been given much attention. While risk recovery techniques are sufficiently explored, the area on risk response, however, remains largely neglected. This has encouraged us to work on the response phase within projects towards risk and/or uncertain events. As explained earlier, the construction industry was selected due to its close association with projects. As a result, our research is based on project risk response success in the construction industry.

We have found very little information on project risk response success; only general information relating to risk planning, assessment and analysis within the field of project management is available. This has inspired us to develop a model for project risk response success. We would like to find out what factors could affect risk response success in projects and eventually develop a framework for risk response success. Risks are everywhere and we deal with risks in our daily lives. The same can be said of projects. Unattended risks or risks that are not responded successfully could affect project constraints. This could then lead to unhappy clients and sponsors and may even contribute to project failure on the whole. This phenomenon on factors determining risk response success in the construction industry is both interesting as well as challenging to work on.

2.2 Literature selection
It is vital that the sources we have used for our literature review should be credible. Our topic consists to determine the factors for project risk response success in the construction industry of Sweden. On the basis of our literature review, we come up with a conceptual model which will guide us to test our hypotheses and aid us in our data analysis. The scientific articles that we have found on our research topic are from Umeå university library’s database: Business Source Premier (EBSCO), JSTOR, Springerlink and Emerald. The keywords that we typed to search for our literature are “project risk”, “project management”, “risk management”, “project risk management”, “project uncertainty”, “risk response”, “project risk response” and “construction.
projects”. Other relevant articles are searched from the references lists of articles which are already found. The articles we used are published in journals like Project Management Journal, International Journal of Project Management and Journal of Construction Engineering and Management. These journals are highly ranked in specialized management areas. To ensure that these scientific articles are highly authentic and credible, we used published articles that are peer reviewed in journals and we considered how often researchers have cited other researchers’ articles in their work. Some of the material which is considered to be useful in our research is gathered from books, unpublished articles and conference papers. Books have been mostly used for our sections on methodology and data analysis. As conference papers and unpublished articles are not highly recommended, we have utilized only few of them which we felt there was an immense need to use in our work. Since we are English speaking students, we limited our search to materials available in English. Hence, we are unable to study valuable material available in Swedish language.

2.3 Critical review of sources
Every researcher should evaluate the independence of research material before using prior research, to assess whether or not the sources are credible, reliable, and up-to-date (Bryman & Bell, 2011). We have ensured a high level of credibility by using peer reviewed articles, books and scientific publications in our thesis. Furthermore, the publications are found in credible and well known journals which emphasize the reliability of our information. In addition, we have gathered only authentic information in our work. We have looked up references for the original sources of information, thereby focusing on first-hand or primary information. This ensures that we have accessed the source of material completely, without being in danger of losing the meaning of the original information which could otherwise occur with second-hand or secondary referencing. Hence, the authenticity and credibility of information sources are maintained. In our study, we have gathered primary data which was collected by means of questionnaires. The respondents are project managers working in the construction industry. Since they are involved in project and risk management, they are well-informed and familiar with our research topic. Moreover, their responses are based on their own experiences. Therefore, the information that they have provided is considered credible and reliable. This gives a high level of trustworthiness to the conduct of our research. We have utilized a statistical package for the social sciences (SPSS) to analyze our data and have taken care to document it in such a way that it is not subject to our own perceptions and emotions. Hence, we have ensured that the outcomes derived from our collected data have maintained their original essence, and not distorted according to the researchers’ own views. Thus, we have established in our paper a high level of integrity with our sources of information.

2.4 Researchers’ preconceptions
It is important to outline what our preconceptions are at this stage since they largely influence our research. We, as human beings, try to be as objective as possible but we cannot deny that our beliefs, attitudes and experiences affect how we view reality and knowledge. Our choice of topic, the literature we select, how we process the information, the type of quantitative tests we perform, etc. are all influenced by our preconceptions. Although we both come from different backgrounds and countries, we share many similarities where our academic studies are concerned. We are both pursuing the Management course at Umeå University as our specialization and have taken the Marketing course as our minor subject. Thus, in terms of
choice of subject, we have utilized our knowledge derived from one of the modules taught, namely Project Management, and we have employed what we have learnt about quantitative methods from another one of our Marketing modules, that is, Marketing Research. Although we have previously worked in different sectors before commencing our studies, neither of us has had any practical experience in project management. Hence, our views, knowledge and methods used to conduct our research are derived mainly from a theoretical standpoint. In this aspect, our preconceptions stem largely from theory and what we have learnt, rather than our attitudes, beliefs and practical experiences. Nevertheless, it is impossible to be free of bias. Our interest in this particular topic has led us to conduct a research in this area and our appreciation for statistical analysis has given us a preference to use these tools in analyzing our data. Hence, these interests and preferences indicate that we are not free of bias. However, as researchers, we are aware that we have to be objective. We firmly believe that we have been as objective as possible in the conduct of our research. We maintain this objectivity by remaining neutral and not adding our own input or viewpoints during the collection of our data. Furthermore, we have used statistical tests for our data analysis and for the subsequent results, which are derived from fixed explanations of these tools. Thus, this information is what it is, and not skewed towards the researchers’ own viewpoints and interpretations.

2.5 Research onion

Our research process can be described using an illustration of the research ‘onion’ as shown in Figure 2 below (Saunders, Lewis & Thornhill, 2009, p. 108). The layers of the ‘onion’ are peeled away, revealing the steps in our research process, from the philosophies to the techniques and procedures of our research (ibid). The first layer, which is the outermost layer of the research ‘onion’ depicts our research philosophy. Our epistemological stance is that of interpretivism and our ontological view stems from constructivism. The second layer of the ‘onion’ is concerned with our research approach. Here, we have selected the deductive approach to suitably guide our research. This is followed by the third layer which denotes our research purpose. Our study is deemed to have both a descriptive and exploratory objective. Our forth layer characterizes our research strategy. We have chosen to conduct a survey which we consider to be the most appropriate strategy. Next, the fifth layer of the ‘onion’ indicates our research method. A quantitative method is employed to address our research gap. The sixth layer represents the time horizon that we intend to undertake in our research. A cross-sectional study will be conducted in this case. Finally the seventh layer, which is the innermost layer of the ‘onion’ describes the techniques and procedures that we have used to carry out our research. It is based on sampling, specifically convenience and snowball sampling, to select our respondents, the administration of a questionnaire to collect primary data and the eventual analysis of our data, where we have used SPSS to aid us.

Our first six layers of the onion will be discussed in Chapter 2 under the section of theoretical methodology. The innermost layer of the onion which represents the sampling, questionnaire and data analysis, concerns the practical methodology, which will be discussed in Chapter 4.

Thus, our research ‘onion’ as shown in Figure 2 illustrates the step-by-step processes which enable us to conduct our study, with the aim of answering our research questions.
2.6 Research philosophy
As mentioned earlier, the purpose of this paper is to develop a framework for project risk response success, explore, and integrate different factors that could affect the risk response success of projects. The research philosophy that we adopt is important because it underlines our assumptions about how we view the world. It is these assumptions which then guide us towards our research strategy and methods employed. (Saunders et al., 2009, p.108)

2.6.1 Ontological considerations
Ontology mostly deals with the “nature of reality” (Saunders et al., 2009, p. 110). Ontology is the researcher’s supposition about phenomena. There are two main types of ontological consideration: objectivism and subjectivism/constructionism. The difference between them is that objectivism focuses on external factors beyond the reach of social actors (Bryman & Bell, 2011, p. 22), where reality is external to social actors (Saunders et al., 2009, p. 110) while subjectivism /constructionism focuses on social phenomenon influenced by social actors (Bryman & Bell, 2011, p. 22). Objectivism is usually adopted for natural sciences and subjectivism is mostly used for social sciences phenomena (Long et al., 2000, p. 192). Constructionism focuses on the interdependence of social actors and everyday social phenomena. Our research would be guided by constructionism as risk response is a social phenomenon which is not beyond the control of social actors; social notion is not only produced by social interaction but it requires constant revision (Bryman, 2008, p. 19).
A comparison of both objectivism and constructionism can be seen in an illustration given (Saunders et al., 2009, p. 110). Management could be seen as an objective entity, especially if managers have job descriptions that govern their duties, have to follow operating procedures that have been established in the organization and are part of a formal hierarchical structure which determine whom reports to whom. As such, even if there is a change in management, for example all the managers in a particular department are completely replaced by new managers and thereafter, if these new managers continue with the same job duties, procedures, etc., then the process of management will be unchanged. If this were the case, it warrants an objectivist philosophy to be adopted as the researcher would see that management had a reality that was separate from the managers that constitute that reality, since the formal management structure in the organization remains unchanged. (ibid, p. 110) Similarly, there could be some procedures and guidelines to follow or reporting structures that are put in place in order to respond to risk in times of uncertainty or when unexpected events occur. Following this, it could possibly be argued that we may take an objectivist stance on the nature of reality, since the project managers could form a separate entity from reality. However, this line of argument is not adopted in our case. This is because the key point in our research is whether these factors would enable a risk response that is deemed successful as viewed by project managers, and whether these same factors are perceived by project managers to be important or otherwise. If we hypothetically replace these project managers in the organization with new project managers, the outcomes of our study on what factors constitute a successful risk response and how important these factors are could likely differ with the change in project managers as these new managers attach their own meanings and make sense of their interaction with the environment. (ibid, p. 111) Therefore, the management has a reality that is not a separate entity from the project managers that make up that reality. Rather, reality is formed from the perceptions of project managers, who make sense and attach their own meanings of what factors would determine a successful risk response and the importance of these factors. As such, this nature of reality is shaped by constructionism, which is what we base on in our study.

2.6.2 Epistemological considerations
Epistemology is the knowledge of social reality to find relationships and construction of knowledge (Long et al., 2000, p. 191). The base of knowledge and relationships between human beings is epistemology. Epistemology has two broad underlying perspectives: positivism and interpretivism. The major contrast between these two is that positivism is used to study natural sciences phenomena. (Bryman & Bell, 2011, p. 17) Furthermore, positivism focuses on study phenomenon which is beyond social reality and based on observations of social reality (Bryman, 2008, p. 13; Saunders et al., 2009, p. 113). Interpretivism, on the other hand, is used to study notions related to social sciences and social world, and highlights the viewpoints of people and their institution (Bryman & Bell, 2011, p. 17). An important characteristic that resides in interpretivism is that the social world has meaning to human beings, human beings’ actions and human beings are different from objects (Bryman, 2008, p. 16; Saunders et al., 2009, p. 116).

Our stance is not one of a natural scientist where we work with observable social reality (Saunders et al., p.113). The knowledge of social reality that we are seeking is not concerned with facts; rather it has to do with impressions (ibid, p.114). We are researching on factors that determine a successful risk response and the importance of these factors, from the perspectives of project managers. The basis of knowledge that we are gathering does not stem from facts. The
success factors of risk response and their importance are not based on irrefutable observations. Instead, the knowledge from these observations can be challenged because it stems from the impressions of project managers, and may not be applicable in a similar fashion from one project manager to another. Therefore, we cannot state that in our case, knowledge of social reality is based on a positivism consideration. As the nature of knowledge is not fixed, since it is derived from perceptions of various project managers that can indeed be refuted, we thus adopt the interpretivism stance.

Moreover, interpretivism is pivotal to study human behaviour and we are also studying project managers’ behaviour toward risk response. The interpretivism philosophy focuses on the social world understanding by scrutinizing the explanation of the world by its participants. Here, social issues can only be understood via people’s behaviour, views and experiences towards certain situations and taking part in certain scenarios. (Bryman & Bell, 2011, p. 420) This is applicable to undertaking our research based on project managers’ perceptions and experiences for project risk response success. The result will be more subjective as it is based on individual experiences and behaviour of project managers.

### 2.7 Research approach

There are two core types of research approaches: deductive and inductive. The major difference between these two approaches is the role that theory plays in the research. In a deductive approach, we test the theory on the basis of what is already known, and from theory we come up with observation and facts. (Bryman & Bell, 2011, p. 11) However, in inductive research, we first have observation, then we find patterns relevant to our observation, come up with a tentative conclusion on the basis of observation and find relevant patterns to observation (Rubin, & Babbie, 1993, p. 41). Another important difference between the two approaches is that in deductive approach, quantitative data is usually used while inductive approach often uses qualitative data (Saunders, Lewis & Thornhill, 2009, p. 127). Deductive research is undertaken to test hypothesis and quantitative research is associated with it, while inductive research is to explore the field and qualitative research is associated with it (David & Sutton, 2011, p. 83).

The deductive process starts with deductive theory is the testing of theory, developing hypothesis, data collection, findings, confirmation or rejection of hypothesis and revision of theory (Bryman & Bell, 2011, p. 11; Saunders, Lewis & Thornhill, 2009, p. 125). With the adaptation of the deduction process model by Bryman & Bell (2011, p. 11), we have enhanced the process of deduction by first developing research questions, then reviewing the literature or theory from which we develop hypothesis, collect and analyse empirical data, confirm or reject the hypothesis based on the findings, and finally, develop conclusions about our research. Figure 3 illustrates this process.
In comparison, the inductive approach is used to develop a new theory, conduct observation and use facts to lead towards theory (Bryman & Bell, 2011, p. 11). In an adaptation (ibid, p. 11) to illustrate the inductive process (Figure 4), this starts with developing the research questions, reviewing the literature, then collecting, analyzing and interpreting the empirical data that will be the basis for which new theory is developed. As seen, the processes in Figures 3 and 4 differ.
2.7.1 Deductive approach
In our study, we have developed research questions on the determinants that could successfully impact project managers’ response to risk, and the importance placed on these determinants. In view of the constructs that have previously been identified by Geraldi, Lee-Kelley & Kutsch (2009) in the defence industry, we are now testing these constructs to see if they are applicable in the construction industry as well. We will utilize existing theory to determine other factors that may mediate these constructs, identify the types of risks, uncertainties and unexpected events that may occur, understand the importance of risk management, etc. in order to develop a framework for risk response success. Therefore, theory and the review of literature is an important process for us because we will derive hypotheses from that. This forms proposed conceptual framework of the study. We would then collect and analyse the empirical data in the context of project managers in the construction industry of Sweden and carry out the testing of our hypotheses. Thereafter, our findings will enable us to either confirm or reject hypotheses. Finally, we can derive at conclusions about what factors would enable a successful risk response in construction projects, and how important these factors are. This is followed by the verification of our initial conceptual framework developed. Therefore, in view of our approach to undertaking our research, a deductive process would be most appropriate.

As opposed to an inductive approach, we are not developing new theory based on data collected. If our research had been to find out what determines project risk response success without any prior knowledge of what these determinants are, then an inductive approach could have been used. If this were the case, we would have started off our research process, for example, by conducting interviews with project managers to find out what would enable them to respond to risk successfully and the reasons behind them, and how important the factors are. We would have then used this data collected to form theories on success factors of risk response. This building of theory would have warranted an inductive approach. (Saunders, et al., 2009, p. 125) However, our research involves the testing of theory, which is followed by a deductive process (ibid, p. 124). The testing of pre-identified risk response success factors in the defence industry to see if they apply to the construction industry, and the subsequent testing of our hypotheses derived from theory, in order to collect our data, warrants a deductive approach. Moreover, using a structured methodology that enables quantitative measurement of constructs in order to test our hypotheses would further support a deductive approach. (ibid, p. 125)

2.8 Research design
The process of research design comes after the considerations of research philosophy and research approach. Our research design outlines our plan of how to answer our research questions. (ibid, p. 136-137) The decisions which we have taken for our research design has encompassed the research purpose, research strategy, research method and time horizon (ibid, p.138).

2.8.1 Research purpose
The research purpose consists of four types: exploratory, descriptive, explanatory and causal. In exploratory research, the focus is on gaining familiarity with the topic, as very little information is available due to the lack of research on the topic. A descriptive study is undertaken to describe accurate situations and events on the basis of researcher observation. As for explanatory research, the purpose is to explain things. Finally, in causal research, researchers have to collect
raw data and create information to develop a cause and effect model, and to study the problems in order to explain relationship between variables. (Rubin & Babbie, 1993, p. 107; Shiu et al., 2009, p. 61-63; Saunders et al., 2009, p. 139-140) Causal research design is used to figure out cause-and-effect of one variable on another (David & Sutton, 2011, p. 16) and it represents that change in one event will bring about change in other corresponding events (Hair, Money, Samouel & Page, 2007, p. 154).

In our case, the research has both exploratory and descriptive purpose, rather than explanatory and causal. The purpose of exploratory studies is to explore certain areas and find out about relationships that exist. In our study, we have to explore the variables that lead to successful project risk response in the Swedish construction industry, their relative importance and also find the relationships between them. There is a lack of studies in our research topic; hence we have to clarify our understanding about this area since there is not much information found here. Investigating on understudied phenomena and identifying variables as well as developing hypotheses give the research an exploratory purpose. (Remenyi et al., 1998, p. 108)

However, it may be argued that since we are taking a deductive approach that is concerned with the testing of theory, it suggests that there should be sufficient theory already in existence, since we are collecting data on the basis of theory. In that case, clarification may be required as to why our study has an exploratory purpose, seeing that we need to seek information on an understudied area. To address this seeming “contradiction”, we state that a conceptual framework on project risk response success in the construction industry specifically has yet to be generated. There has not been prior research conducted yet on this area; hence the exploratory purpose of our study arises. Nevertheless, we use existing literature on project management, risk response, etc. as well as theories and previous studies on successful risk response in defence-related projects in order to support a deductive approach. Hence, despite having a deduction process, the objective of our study, concerning the specific industry, is an exploratory one.

At the same time, since we are seeking to describe both the factors that are required for successful risk response and to describe the relationships between dependent and independent variables, then this calls for descriptive research as well. According to Shiu et al., (2009, p. 225-226), descriptive research is mainly quantitative in nature and usually uses data collection procedures that largely emphasize on asking respondents structured questions about their opinions, feelings and actions. In this aspect, a descriptive purpose is appropriate for our study, especially since we are conducting a study based on having highly structured questions, with the aim of testing variables and hypotheses. This will be done by gathering the responses of project managers, after which the data will be measured in quantifiable terms and described. Thus, our study has a descriptive objective as well.

Since our research does not explain the relationships that exist between the concepts, that is, focusing on “why” things happen, it is not of an explanatory nature. Our research objective after all is not seeking explanations or reasons as to why the factors constitute successful risk response, or otherwise. Similarly, our study does not address the cause-and-effect relationships between the variables. We are studying what the determinants are, that contribute to risk response success in construction projects, and how important these determinants are. As such we are not seeking to measure changes in the determinants (independent variables) that cause
changes in project risk response success (dependent variable). Thus, our research is not considered to be causal either. Hence, we use the term of “exploratory-descriptive” for our research purpose.

### 2.8.2 Research strategy

Our choice of research strategy depends on our research questions and objectives, research approach and philosophical underpinnings. Strategies include experiments, surveys, case studies, grounded theory, ethnography, etc. (Saunders, et al., 2009, p. 141) For our study, a survey strategy is appropriate. Surveys are often associated with questionnaires and structured interviews linked with deductive approach. (Remenyi et al., 1998, p. 47, Saunders et al., 2009, p. 138-155) There are several advantages of using surveys in our research. Firstly, surveys are able to accommodate large sample sizes, and the data obtained will enable us to make inferences about the target population as a whole. (Shiu, et al., 2009, p.226) This is ideal in our case as we would like to conduct our research on a large sample of construction project managers so as to be able to generalize our results on risk response success factors to the whole of the construction industry. Secondly, the data gathered from surveys can be analysed in many different ways and the analysis can be based on multiple variables. Moreover, data analysis on surveys can detect small differences which may not be apparent in data analyses of other strategies and are able to facilitate the use of advanced statistical analysis to identify trends in the data. (ibid, p. 226) This is especially useful in our research as we are using several variables that make up the constructs of successful risk response and we can conduct the data analysis using several variables at a time. In addition, we can use advanced statistical analysis, e.g. via SPSS to identify data patterns and any small differences. For instance, when we want to measure the importance of the factors concerning risk response success, any small differences of importance placed on the various variables can be detected and will hence give us a rather accurate measure of relative importance, which may otherwise not be available to us had we used non-survey strategies like case studies, grounded theory, ethnography, etc.

However, there are certain drawbacks associated the use of surveys. With this strategy, there is a limit to in-depth data analysis and to the control over timeliness. Furthermore, surveys are associated with potentially low response rates and respondents may not be providing truthful answers. (Shiu, et al., 2009, p. 227) In our study, we are aware that we will not be receiving in-depth responses; rather the responses will be based on a fixed set of questions together with fixed options for the answers. This would not be much of a concern as our objective is not to get detailed responses that may otherwise accompany other research strategies like case studies or action research which would provide rich data. As for the issue with potentially low response rates and lack of timeliness, we would ensure pro-activeness on our part in getting back the responses. We could also start off with a fairly larger sample size so as ascertain that we have at least a high number of surveys that have been responded to, in absolute numbers, despite a low response percentage. Also, if we do not get the responses back in a timely manner, we could send repeated reminders to our respondents or even provide incentives to entice them to hand in their survey results quickly.

As for the other types of research strategies, they are not suitable for our study. For example, experiments are not often used in management research as they could be costly and complex, and hence not feasible. (Saunders, et al., 2009, p. 141) The nature of experiments involves having
two groups; one, a control group where no intervention is made, and second, an experimental group where there is an intervention made associated with what is being studied, usually a cause-and-effect relationship. (ibid, p. 142) If we were to employ this strategy, we would have to conduct research with two groups of project managers, keeping the independent variables of risk response factors constant in one group (control group), and allowing changes in each of these independent variables one at a time to determine changes in the dependent variable, risk response success, in the other group (experimental group). Administering this would have been exceptionally complex, time consuming and costly; therefore this strategy is not considered. Case studies would have been ideal if rich data were required and the findings were to be established for only the cases studied. However, as our research does not require such in-depth information, and more importantly, since there is a need to generalize the findings to the population, case studies would not be an appropriate strategy for us. As for grounded theory, the focus is on developing and building theory, and is conducted through a combination of induction and deduction. (ibid, p. 149) As previously mentioned, our study is based on the testing, and not building, of theory and consists mainly on a deductive approach, grounded theory is not an applicable research strategy in our case. Similarly, for ethnography, which is based on an inductive approach, and involves the development of new patterns of thought according to observation (ibid, p. 149), is also not a relevant strategy for us. Thus, in view of these various research strategies, surveys are the most appropriate for our study.

2.8.3 Research method
There are two main types of research methods, i.e. qualitative and quantitative. Although not set in stone, and there are exceptions, a qualitative method usually follows an inductive approach which develops theory whereas a quantitative method normally has a deductive approach which tests theory. A qualitative research process involves generating research questions, selecting relevant respondents, collecting relevant data, interpreting the data, forming the conceptual and theoretical frameworks, generating the findings and making conclusions. (Bryman & Bell, 2011, p. 406) A quantitative research process consists of several procedures: reviewing and utilizing the theory, generating hypothesis, establishing the research design, devising measurements of the concepts, choosing the research site, selecting research respondents, collecting, processing and analyzing the data, determining the findings and making conclusions (ibid, p. 155). Another major difference is that quantitative research usually uses structured questions which are close-ended, whereas the qualitative research often makes use of open-ended questions that are based on interviews, observation, etc. (Creswell, 2004, p. 17). Quantitative research focuses on numeric data, where data is measured in numbers to represent the characteristics of something, while qualitative research focuses on non-numeric data which provides description of data gathered from interviews, observation, etc. (Saunders et al., 2009, p. 151, Hair et al., 2007, p. 151). A list of common contrasts between qualitative and quantitative methods is shown in Table 1 (Bryman and Bell, 2011, p. 410).
As researchers, we want to explore the constructs that affect risk response success in the construction industry by validating and testing variables and relationships of these constructs, as stated by Geraldi, et al. (2009) with project risk response success. Qualitative method is used for theory generation while quantitative method is used for theory testing (Long et al., 2000, p. 195). For that reason, we choose the quantitative method. Authors like Silverman (1993) claim that qualitative methods can be used to test the theory as well (as cited in Bryman & Bell, 2011, p. 408). According to Creswell (2004, p. 120), a quantitative study is “an interrelated set of constructs formed into hypothesis that specify the relationship between different variables, with the purpose to explain natural phenomena”. It can be clearly seen in our research that we are using the pre-identified constructs (Geraldi et al., 2009) as independent variables to study their relationship with the dependent variable of risk response success, and are thus, testing theory. Our study involves the formulation of hypotheses to address these variables which will consequently be tested. Structured questions will be used to gather data from our respondents. The data analysis will be performed using statistical tools (SPSS) to provide mainly numerical information. The findings based on our sample of project managers will then be generalized to the population of the construction industry in Sweden. As such, this entire process strongly calls for a quantitative research method.

### 2.8.4 Time horizon

Finally, another consideration to the research design concerns the time horizon. Research that is conducted at a particular time which is akin to a “snapshot” research is refers to a cross-sectional study. (Saunders et al., 2009, p. 155) This is a study of specific problems within specific time frames at any one point in time (David & Sutton, 2011, p. 207; Hair et al., 2007, p. 156). On the other hand, if the research is undertaken over a given period of time, which can be thought of as a series of snapshots, then it is referred to as a longitudinal study (Saunders et al., 2009, p. 155). Here, the data is collected from the same sample at two or more points in time and this study is useful to study social change (David & Sutton, 2011, p. 207; Hair et al., 2007, p. 156).

As the data collection process of our study is not intended to occur over more than one point in time, and since our objective is not to measure change in data over these different time points, it

---

### Table 1: Common contrasts between qualitative and quantitative methods

<table>
<thead>
<tr>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers</td>
<td>Words</td>
</tr>
<tr>
<td>Point of view of researcher</td>
<td>Point of view of participants</td>
</tr>
<tr>
<td>Researcher distant</td>
<td>Researcher close</td>
</tr>
<tr>
<td>Theory testing</td>
<td>Theory emergent</td>
</tr>
<tr>
<td>Static</td>
<td>Process</td>
</tr>
<tr>
<td>Structured</td>
<td>Unstructured</td>
</tr>
<tr>
<td>Generalization</td>
<td>Contextual understanding</td>
</tr>
<tr>
<td>Hard, reliable data</td>
<td>Rich, deep data</td>
</tr>
<tr>
<td>Macro</td>
<td>Micro</td>
</tr>
<tr>
<td>Behaviour</td>
<td>Meaning</td>
</tr>
</tbody>
</table>

*Source: (Bryman and Bell, 2011, p. 410)*
therefore does not warrant a longitudinal research. Rather, a cross-sectional study would be the most appropriate in our case. We are interested in finding out the determinants of project risk response success, and their importance, at just any one particular point in time. Hence, a cross-sectional research is undertaken here.
3. Literature review
This chapter starts with the theoretical underpinnings of the thesis. The chapter also elucidated literature framework and describe relevant theories. The chapter aims to equip the reader with relevant literature for our study. It will present a smooth transition from general to specific theories, It help us to come up with proposed conceptual model as well as derive at hypotheses and explanation of determinants for project risk response success.

3.1 Literature framework
Before we go into the literature review, we feel that it is necessary at this stage to introduce our literature framework, as seen Figure 5 below. It serves as a guide for the reader so that the flow from the general topic area to the specifics can be easily followed and understood. This framework gives logic to the path that our literature takes towards our research in question. As illustrated, we start off with the general topic of project management. Within this topic, we will address a specific knowledge area, which is Project Risk Management. Within this field of Project Risk Management, we have chosen to study Risk Response in more detail. Our research will be concerned with risk response success factors in the context of projects in the construction industry of Sweden and based on the perceptions of project managers.

![Figure 5: Literature Framework](image-url)
3.2 Project and risk

3.2.1 Project
“A project is a temporary endeavor undertaken to create a unique product, service, or result” (PMBOK, 2004, p. 5). It is necessary to identify the similarities and differences between risk and projects (Mallak & Kurstedt, 1997, p. 14-15). Projects are synonymous with risk. However, they have some differences as well. According to the authors (ibid), some similarities include the concept of uniqueness and temporal natures. In this aspect, both projects and risks are unique in nature. In addition, projects and risks both are temporary. Risks, uncertainty and projects are also inter-connected; projects are inherited with risk and uncertainty, and risk is always a part of projects. However, a main difference is that projects have a known start and end points whereas risks are perplex. Perplexity is an event with an unknown start and end. Therefore, on the most part, projects and risk are strongly linked, and they go hand-in-hand.

3.2.2 Project objectives / constraints
Usually every project has cost, schedule (time), and quality objectives. Project objectives can also include cost, schedule, and quality targets.

Time: It is linked with estimated time to deliver the project. Time planning is challenging. A good project needs to be finished within a specific timeline. If a project is finished too early, it might be too expensive since more resources are utilized to finish it earlier. On the other hand, if a project finishes too late, it shows inefficiency and inability to meet deadlines, thereby resulting in quality compromises.

Cost: A project has to be finished within the budget set. The budget is decided before the project is started. A good project is not only finished within the budget; the project manager also wants to incur expenses that the project is not over-budget. Alternatively, the project should not be under-budget, as it will compromise the quality.

Quality: Quality has different meanings to everyone and has many definitions. Quality in project management deals with projects that fulfill client desire and demand customer satisfaction. Quality also refers to characteristics and attributes of projects. (Maylor, 2005, p 142-145)

3.2.3 Risk
A project risk is defined as “an uncertain event or condition that, if it occurs, has a positive or a negative effect on at least one project objective, such as time, cost, scope, or quality” (PMBOK, 2004, p. 238). Events are said to be certain if the probability of their occurrence is 100% or totally uncertain if the probability of occurrence is 0% (Jaafari, 2001, p. 89). Risk can be known and unknown as well (Krane, Rolstadås & Olsson, 2010, p. 82-83). Risk and uncertainty are a major part in everyday activities of projects. It is necessary to give proper attention to risk; if it is left unattended, it would be difficult to handle. There is no risk-free project. (Raz, Shenhar & Dvir, 2002, p. 101) The nature of risk and uncertain events is unrepeatable. Risk can be unrepeatable in a sense that the same risk might occur but in different settings with different levels of risk, so the outcome would not be the same. Risk is a turning point for projects. (Davies & Walters, 1998, p. 397) Uncertain events and risk distract, and even divert, from normal operations, project goals and objectives (Mallak & Kurstedt, 1997, p. 15-16). Risk is inherent in all projects, so it is not possible to fully prevent it. Risk is also a barrier to success (Nieto-Morote
& Ruz-Vila, 2011, p. 220); if not handled well, it could lead to project failure. Risks contain negative and positive impacts; negative impacts contain threats and positive impacts contain opportunities. Although it is common to think of risks in terms of negative aspects, opportunities that are derived from such risks can be considered in a positive light. It is understandable that uncertainty in projects is inversely related to project constraints. Due to certain risks, it could be possible that the company loses its clients, terminates the contract and its reputation could be affected. (Frigueiredo & Kitson, 2009, p. 08.7)

The following are characteristics of risks: 1) Risk is a future event which may or may not occur; 2) Risk must be uncertain; if it occurs, it affects project constraints; 3) The probability of risk is greater than 0 and less than 100, events that have chances of 0 or 100% occurrence are not considered as risk; and 4) The consequences of risk must be unexpected and not preplanned. (Nieto-Morote & Ruz-Vila, 2011, p. 220) These aforementioned characteristics need to be understood for the purpose of our study. This would aid us to have a better grasp of what is risk and some of its distinguishing characteristics so that we know the general topic of what we are researching on. To understand the type of risk that project managers have to handle, the risk classification will be useful to know.

3.2.4 Risk classification

There are two types of risk: strategic risk and contextual or operational risk.

*Strategic risk:* There can be different types of strategic risk found in improper decisions, their implementation thereof, strategic goals and the resources required for the completion of projects, which are beyond the control of the project practitioners. Nevertheless, the project owner can control the risk. There are two types of strategic risk: short term strategic risks and long term strategic risks. 
*Short term strategic risks* are related to objectives that have an impact on users and the target group. These risks contain unclear project functionalities and deliverables. On the other hand, *long term strategic risks* are related to long term objectives of projects, in particular, the project purpose. Project objectives and goals are a big contributor to project success.

*Contextual or operational risk:* The second kind of risk is called operational or contextual risk, and it involves external environmental threats, disasters, crises, change in government, legislation, management, market conditions etc. Contextual risks are difficult to handle but have significant impact on project success. (Krane et al., 2010, p. 83)

As it was mentioned in a study of 1,313 risk elements identified in seven large projects, the operational risks were dominant, owing to 90% of total risk, while strategic risks contribute to the remaining 10%. The required response actions to be taken vary, according to the different intensity and category of risks. (Krane et al., 2010, p. 84) This information is useful for us that project managers handle operational risks since strategic risks are beyond the control of project managers which represent that our respondents (project managers) would respond to questionnaire according to their experience of controlling operational risks.
3.2.5 Level and severity of risk

The risk can be known or unknown. We can plan for known risks but unknown risks are complicated to plan and handle. Most of the time, project managers are stressed to finish projects on time, and this increases the intensity of risk as well. (Armour, 2005, p. 17-18) Project managers are facing ever-increasing challenges due to rapid changes in projects. Project managers are under great pressure to complete deliverables within a limited time, without sacrificing the cost and quality of the project and making clients happy. This pressure makes the project more uncertain. (Karlsen, 2011, p. 2-3) A project with high severity of risk has more chances of failure as compared to one having a low severity of risk (Zwikael & Ahn, 2011, p. 27).

There are three dimensions used to measure, evaluate severity and level of risk. The first is Risk Impact which is the effect of risk on a project objective. It can be classified as critical, serious, moderate, minor, or negligible. The second parameter is Risk Probability which examines the likelihood of a risk occurring. It can be viewed as high, medium, or low. The third dimension is Risk Discrimination which looks at how risk affects the project as a whole, rather than investigating each risk separately. This compares between risks and the scales of comparisons used are: much less, less, same, more, or much more. Finally, the risk factor, which is a value measuring the risk is computed as follows:

\[
\text{Over all risk factor} = \frac{\text{risk impact} \times \text{risk probability}}{\text{risk discrimination}}
\]

(Nieto-Morote & Ruz-Vila, 2011, p. 224; Norfleet, 2009, p. 02.6-02.8)

Following the above equation, a risk that has a great impact on project objectives and is likely to occur whilst having low risk discrimination contributes to a high risk-level. Such risks especially need to be managed well so that project objectives can be met. These are risks that project managers must be more attentive towards so that they are responded to risk successfully, as compared to risks that have a low risk factor. Not all risks are given equal attention; high-level risks are given more concentration. Risks with a high risk factor are the main concern of this study.

3.2.6 What risks to take and to avoid

In each project, we expect reasonable returns but most of the time, businesses do not know the levels and kinds of risk that the project will have to face. It could be possible that a project with high returns will be more risk-prone, so it may be advisable to take a project with manageable risks and fairly good returns. It seems unwise to invest in a project where risks are high and returns are unremarkably high. (Armour, 2005, p. 20) It is important that resources are committed for risk management as well. For example, if resources cannot be committed towards the management of risks, then it would not be feasible to undertake these risks or projects containing such risks, knowing that they cannot be handled well and could hinder project success. Uncertainty is found in every aspect of decision-making. For instance, we consider buying of a new car. The selection criteria might include style of car, speed, interior and its price. However, there are certain criteria which are not negotiable, such as security, durability and
value in terms of price. These criteria may lead us to think of alternatives as well. (Norfleet, 2009, p. 02.3) So several steps should be taken while considering a go/ no go decision in projects: 1) Proposed risk management framework; 2) Identify alternatives for projects; 3) Identify and write down the risk events, and take the least risky project; 4) Analyze the level and severity of risk; 5) Develop the risk breakdown structure (RBS) for risk; and 6) Analyze the activities and then develop responses for them. (Dey, 2009, p. 24)

3.2.7 Risk breakdown structure (RBS)

There is no specific global calibrate for risk response. Risk breakdown structure is used to organize and manage risks on an operational and strategic level. (Nieto-Morote & Ruz-Vila, 2011, p. 227) It is vital that project practitioners conduct brainstorming sessions in which they can recognize the levels and kinds of risk, which would be helpful for risk identification. Risk identification lists the risks factors; it states what the risks are. Each and every risk requires specific attention, so we need to divide risk into manageable, small tasks called risk breakdown structure (Hierarchical structure of risk). It is the blueprint for risk and provides a roadmap for risk management. It is good to divide project risks according to their types, so that appropriate attention is given to them. The hierarchical approach gives a holistic overview of risk and is a most intelligent breakdown of risks, according to types of risks. This provides a great deal of information. (Dey, 2009, p. 23-24) The basic purpose of RBS is that risk data can be organized and structured to provide a standard presentation of risks which facilitates understanding, communication and management (Hillson, 2003, p. 86-87). It is required to identify and categorize the number of risks, and then break them down in order to efficiently handle them. The risk hierarchy contains a number of risks, and these risks are grouped into chunks of manageable pieces. (Nieto-Morote & Ruz-Vila, 2011, p. 221) The primary classifications of risk are: natural and human. Natural risks are beyond human control while human risks arise due to human behaviour. According to Nielsen (2006, p. 65), project risk is divided into different risk elements and factors.

Human related risks

Below-mentioned are human-related risks which are incurred due to human activities and can be controlled by humans:

Delivery/ Operation risk: The main issues are actual engineering, procurement, construction execution, and operation of the project.

Technology risk: This risk factor revolves around issues related to technologies involved in the execution and operation of the project. Tendering, cost estimation, scheduling, deliverables, design failure, accident, collision and equipment and system failure come under technical risks.

Procurement-contractual risk: This risk factor deals with issues linking the contractual and procurement approaches.

Financial risk: This risk is related to the financing of projects. Financial risks deal with interest rate, credit rating, cash flow and rentals, etc.
**Political risk:** This risk factor associated with the local, regional, and national political situation of the project. The risk involves government and foreign government interference for national and multinational companies. War, taxes and other disorders are included in political risks.

**Environmental risk:** This risk factor has to do with environmental-related issues, including green and eco-friendly environment issues.

**Social risk:** This risk factor deals with the social and cultural impact on the project.

**Economic risk:** This risk is concerned with the economic impact on the project. This risk deals with inflation rate, currency exchange rate, material and labor supply.

**Social risks:** Social risks refer to criminal acts, including damage to construction projects and substance abuse.

**Legal risks:** Legal issues are related to contracts and regulations for construction projects.

**Health risks:** Health issues relate to the occurrence of disease outbreaks due to infection and virus on projects sites.

**Managerial risks:** Human resource management, quality insurance, as well as health and safety-related issues all come under managerial risks.

**Cultural risks:** Cultural risks are related to international projects where people from diverse cultures work together, pertaining to customs, norms, and religion.

**Natural risks**
The following are types of natural risks:

**Weather related risk:** includes floods, storms, tornados, typhoons, hurricanes, etc.

**Geological risk:** includes earthquakes and volcanoes.


The different types of risks as mentioned above are summarized in the risk breakdown structure as illustrated in Figure 6 below. It is important to note that we have included both human and non-human related (natural) risks in this breakdown although we are aware that we are focusing on operational risk, which can be classified as human related risks. More specifically, we are studying operational risks that are within project managers’ control; as such, we acknowledge that not all of the human related risks mentioned are controlled by project managers. Nevertheless, we have included all the various risks so that the risk breakdown structure is presented in a more complete manner. It also gives the reader an insight and generates a better understanding on all the types of risks that are inherent in projects.
3.3 Project management vs. Risk management

In this time of globalization where everyone refers to the world as a global village, businesses involve a high level of uncertainty and risk. Risk management is important for project management. Projects are highly vulnerable to risks due to project constraints of limited time, budget and quality outcome. Risk management provides details to team members about how they can handle risks, what resources are required and what the cost is to handle these risks. Risks cannot be fully eliminated from projects. Project management and risk management are usually treated as separate fields. However, it is required to integrate risk management into project management so that it could be helpful for managers to take sufficient action. As we know, risk is inherited in projects, so it is crucial to integrate risk management into project management. (Zwikael & Ahn, 2011, p. 33)
“Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing”. (PMBoK, 2004, p. 8) Project management includes nine knowledge areas, where project risk management is one of them (ibid). “The objective of project risk management is to increase the probability and impact of positive events; and to decrease the probability and impact of events adverse to project”. (PMBoK, 2004, p. 237) Risk management is the essence of project success. Since risk management is a very influential factor for project success, it is included in the nine knowledge areas in PMBoK. (Krane et al., 2010, p. 81; Raz, Shenhar & Dvir, 2002, p. 102; Kutsch & Hall, 2010, p. 246) Risk management is the underlying ingredient of project management and it is helpful to define the uncertainty in projects. Project management and risk management goes hand-in-hand. (Arrow, 2008, p. 01.6) Risk management is useful to tackle unpredictable and unexpected events that may occur in projects, thereby playing a major role in project success (Kutsch & Hall, 2010, p. 246).

3.3.1 Importance of risk management in projects

It is human nature that people learn from past uncertain events in order to prepare themselves for future challenges. A number of projects fail to achieve their desired outcomes and not finish according to project constraints, i.e. time, cost and quality. There could be many reasons for project failure but risk is one of the most important. It is crucial to minimize the impact of risk in order to attain project success. In any project-based organization, it is required to pay attention to uncertain events. Uncertain events are the main obstacles in project success. (Krane et al., 2010, p. 82-83) Therefore, risk which is associated with uncertainty, and its management thereof, is vital for project success. If the risk is well managed, then it would contribute to project success. In the contemporary era of competition, project success becomes increasingly subject to discussion and debate. Each project is different in nature and contains integrated risk in it. Risks are undesired events that can compromise project success and resources, and even cause delays which sometimes result in project failure. We cannot avoid risks but we can prepare ourselves to minimize or mitigate these risks. Project risk and its management thereof is a debatable issue since a few years back. (Raz, Shenhar & Dvir, 2002, p. 101-102)

In today’s businesses, organizations cannot completely secure and tolerate risk but what they can do is to handle risk in a successful way. Future risks may be different in nature from the previous ones but each risk contains a learning opportunity and lesson in it. The organization can be risk-tolerant by implementing proper risk management. However, if organizations totally neglect the consequences of risk, and when they fail to achieve desirable objectives, they may find it easy to scapegoat by blaming different departments and functional units for their failure. Delays due to inappropriate risk management are regrettable for the project manager and team members who are under pressure and being criticized for poor performance for the assigned project. Every project is risky and every project is unique; anything which comes under routine work is not considered as a project. However, when we do something unique, there are high chances of uncertainty and challenges that come along with it. It depicts that every project inherits a risk factor. It is useful to mention the probability of success and risk that occur in projects. For example, if project success has a probability of 80%, then it means that there is a 20% probability of failure, or risk, as well. An important aspect is that organizations want success for sure, which is a crucial objective for the completion of any project. (Armour, 2005, p.17-19)
is especially important for risks or uncertain events that have an impact on the critical path of any project. If management of risk is not timely accurate, project delays could result and lead to problems of financial overruns, time delays and quality compromises. Risks, if not properly managed or responded to, could destabilize the project. External as well as internal risks affect the project performance. An organization that cannot handle project risks well loses its worth, reputation and relationships with stakeholders. (Hällgren & Wilson, 2008, p. 31) Thus, the importance of risk management in projects cannot be undermined. This contributes to the criticality of the topic in our study, and an effective risk management process is required in order to better handle risks in projects.

3.3.2 Risk management in projects: Proactive vs. Reactive
Risk management should be proactive, not reactive. Whether we think about it or not, we make decisions for risks every day. Typical examples include fastening/not fastening your seatbelt the moment you enter your car. We may not think of these actions in terms of managing risks, but they are prime examples of the presence of risk management in our everyday lives. Similarly, management of risks is required in projects, especially of a proactive nature. Reactive risk management could lead to late discovery of risks, and this is problematic as it enhances complexities which create difficulties in taking appropriate actions on time. Reactive behaviour is akin to fire-fighting and proactive behaviour is compared to fire-lighting. (Kaliprasad, 2006, p. 26-29) By being proactive, risks can be discovered in the earlier phases of the project life cycle, there could be less complexities present at that time and timely appropriate actions could be taken. Hence, it is important to have a proactive risk management plan in order to better cope with project risks (Le, Caldas, Gibson & Thole, 2009).

3.3.3 Effective risk management process in projects
Literature (Nieto-Morote, & Ruz-Vila, 2011, p. 221; Frigueiredo & Kitson, 2009, p. 08.2; Karlsen, 2011, p. 4; Kaliprasad, 2006, p. 30-33; Hillson, 2003, p. 90-95) shows that effective project risk management involves the following phases:

**Risk management planning:** plan and practice risk management. It includes communication and transformation of strategy and methodology.

**Risk identification:** recognize the type of risk, record its characteristics, and develop a framework to identify, describe and report risk. Brainstorming sessions, checklists and reviews of previous records of project risks are included in it.

**Risk assessment:** prioritize risk for analysis by combining and assessing for future support. Qualitative and quantitative risk level assessment is involved. Risk description, impacts and probability of risks are analyzed.

**Risk response:** take action against risks, enhance opportunities and reduce threats. It includes these options: avoidance (abolish risk totally), mitigation (reduce the risk impact and probability), acceptance (use contingency plans to take action against risks), research (undertake proper research, survey and studies for risk response), transfer (pass the risk to another party, for example, through insurance), and monitoring (keenly observe the situation and trends in order to take a go/ no go decision pertaining to risks).
**Risk monitoring and reviewing:** The process includes implications of risk response, keeping track of risks, monitoring, evaluating, and trying to determine new risks in projects and the effectiveness of actions taken for previous risks. Monitoring includes checking the performance in risk identification, assessment and response, in order to bring improvement to it.

Among these phases, we are researching on the phase related to risk response as there is a lack of prior studies conducted in this area. Moreover, it is a crucial stage facing project managers because once risks are identified and assessed to be of high impact and probability (with a high risk factor as discussed in section 3.2.5), project managers are faced with the task of responding to them. This is not to say, however, that the other phases are less important.

### 3.4 Risk response in projects

Project risk response is to take action and rank the risk elements according to its level. It is important that risk response may have capacity to tackle all kind of risk events. It is pivotal to consider the planned risk response, candidate risk response and to estimate the cost of responding risk. The impact of risk action on project success and risk events is also important to observe. It is required to stop planning; everyone is focusing on planning it’s time to take action. List of risk response action should be prepared and updated on regular basis. (Syedhosini et al., 2009, p. 758-761)

Risk management techniques and tools are rarely used to handle and manage risk in real business world. However, project management body of knowledge included risk management in six steps but it is very general and not applicable to every industry. Risk response is required to be taken when project constraints are effects with it and when risk values are exceeding with the project budget. Risk response involves four activities, as discussed in section 3.3.2.

**Risk avoidance:** the most preferred approach is to avoid the risks but some risks are unavoidable. They are organic risks from which a project cannot avoid itself. It could be possible to change the design, requirement, specification etc. One technique is choosing among alternatives in order to eliminate risks.

**Risk transfer:** risk transfer means to shift the responsibilities for risks that are associated in risk response activities.

**Risk mitigation:** the approach retire the consequences of risk that it does not affect project. It included reducing the likelihood of risks.

**Risk acceptance:** the least preferred approach is to accept the risks. It means the decision is to accept the risk not to mitigate and avoid it.

(Simmons et al., 2009, p. 07.4-07.7; Sillars & O’Connor, 2009, p. 111-113; Jaafari, 2001, p.91-93)

**Risk response:** take action against risks, enhance opportunities and reduce threats. It includes four to six options: avoidance (abolish risk totally), mitigation (reduce the risk impact and probability), acceptance (use contingency plans to take action against risks), research (undertake proper research, survey and studies for risk response), transfer (pass the risk to another party, for
example, through insurance), and monitoring (keenly observe the situation and trends in order to take a go/no go decision pertaining to risks).

Within the risk response phase itself, we focus on the determinants of successful risk response; be it avoidance, mitigation, acceptance, research, transfer or monitoring of risks. These different ways of responding to risk may in fact warrant different success factors but for the purpose of our study, we will not tackle each of these options distinctively. Rather, we want to derive at a general risk response framework, and therefore have addressed the risk response phase holistically, which comprises of all these options herein.

3.4.1 Reasons for poor risk management and risk response
There are several major reasons for poorly-managed risk. A common reason for project risk management failure is due to inefficient risk response actions in managing risks. Risk management should be included in the culture of an organization, and for that, proper training, trust and confidence and communication is important. Project managers and their leadership traits and roles, team skills, negotiation, freedom of expression and empowerment are important elements to be considered. (Arrow, 2008, p. 01.7) Lack of knowledge, inadequate training, lack of cooperation between team members, lack of change control and complex organization hierarchies make decision processes slow, thereby causing delays. (Imbeah & Guikema, 2009, p. 780; Chua, 2009, p. 32) These factors could hinder successful risk response when uncertainty or unexpected events arise. Risks are unique events but projects can be risk-prepared, and not risk-prone, by taking preventive measures. In doing so, it could be possible to minimize the risks and reduce the impact of unavoidable risks. (Davies & Walters, 1998, p. 400)

3.4.2 Fundamental for risk response success association with organizational practices
The doctrine for project risk management is especially relevant during risk response. There are some factors that could be useful in responding successfully to uncertain events.

Maintenance of calmness: Risk is uncertain and it creates panic and fear but the team members working on project should act in a professional manner. It is essential to have an attitude which is calm and optimistic towards handling risks. It is the responsibility of managers to transfer their team members’ feelings from that of hopelessness to coordination in order to manage risks. (Hällgren & Wilson, 2011, p. 15)

Team dynamics and alignment under pressure: Even under the best working conditions, team dynamics is a big challenge. In risk situations, people may have emotional outbursts that could be a result of stress and not knowing what to do. It is important to clearly mention the goals, guidelines and what the organization expects from them in risk situations, which may not demanded of them under normal working conditions. It is a good practice to have blue-prints of all activities that are required to be done in any given day. (Doloi, 2009) Due to this reason it was suggested by a few researchers (Doloi, 2009; Raz & Michael, 2001) to have two teams: one for projects, where the members are specialized in project activities, while the other is a special team for handling risks, when there is any risk identified by the project team. In the case of the latter, then the risk response team’s main function is to take actions against that risk. Working
well together within the team and knowing what needs to be done in order to handle risks are important to alleviate the pressure caused by unexpected or uncertain situations.

**Assessment of situation and assignment of responsibility:** It is the responsibility of project managers to identify the risk and secure the necessary resources of the organization. Assigning proper responsibilities are also one of the most critical tasks. Making every person responsible for a problem could lead to enhancing reliability. It is essential that risk management is the responsibility of everyone, and roles are assigned to each individual to manage the risk. Regardless of the organization’s structure and the working relationships within it, it is vital to have the right people at the right time and at the right place, to respond to any kinds of risk. (Raz & Michael, 2001, p. 11-16)

**Active leadership:** Active leadership with positive attitude and belief that everyone’s contribution will reduce and even void the risk is another important factor in risk response. Sharing success with the team and recognizing people’s efforts and their work are attributes of good leadership. Being a leader who can resolve conflicts, come up with solutions, and give people a way to participate in providing the solution, all point to active leadership. In addition, giving people hope and providing a safe environment where they can communicate and share their fears and concerns are also facets of active leadership. (Smith & Mindum, 2003, p. 36-37)

**Communication, negotiation and coordination:** An important factor is communication between all stakeholders for the progress and change in projects during the presence of risk. Communication is a vital tool for project success but it is especially relevant in times of uncertainty. This is so that there is clarity in the exchange of information and it impacts the type of actions taken to respond to risks. In addition, it is important that project managers are closely involved with contract negotiations in order to allocate specific amounts of budget to handle risks and take corrective actions for risk response. Effective negotiation thus enhances the ability to respond to risks successfully. Another closely related factor of risk response is coordination. It is the prime responsibility of project managers to integrate upstream and downstream information and make the best use of it. Similarly, project managers also need to coordinate the allocation of resources towards risk response (Jaafari, 2001, p. 98). Therefore, successful risk response entails proper communication, negotiation and coordination.

**Hierarchical structure:** It is critical to have in an organization a hierarchical structure that can support and generate an attitude towards a safety culture. This includes the ease with which information flows and the adaptability of the hierarchical structure to changes that occur so that risk response actions can be taken quickly. It is important to use both top-down and bottom-up approaches as well as a flexible hierarchical structure for managing risk response. Using a mixture of both the approaches combines top management’s strategic experience as well as team members’ first-hand knowledge of inherent issues in making decisions that are more appropriate to tackle risks. With a flexible hierarchical structure, decisions need not have to undergo much “red tape”; rather, there exists autonomy and ease with which risk response actions can be taken rapidly. This then facilitates project risk response success. (Davies & Walters, 1998, p. 399-400; Ivory & Alderman, 2005, p. 7-10)
**Training and education:** Training and education are essential for individuals, groups and the organization as a whole, so that they can prepare themselves for risk. Proper guidelines need to be provided for individuals and groups to manage their propensity towards risk. It is important to learn from the experiences of previous risks to better manage future ones. Employee skills, training, drills, employee development programs, and reports and manuals are important tools for risk management. However, it is required that training and drill sessions are updated on a regular basis so that they remain relevant in the management of risk. (Davies & Walters, 1998, p. 399-400; Ivory & Alderman, 2005, p. 7-10)

**Empowerment and Sense of urgency:** Risk should be communicated in a way that it should remain foremost in one’s mind. It is vital that all project practitioners must understand what the risks are and what kinds of risks they can face, as well as have the empowerment to make decisions and respond to risks. Having a sense of urgency is also crucial; risk response actions need to be taken without delay and procrastination so as to avoid adverse consequences. (Hällgren & Wilson, 2008, 2011, p. 11; Karlsen, 2011, p. 8-12; Smith & Mindum, 2003, p. 32)

It is important to note that the aforementioned factors of risk response success are neither exhaustive nor exist independently. Behaviour-readiness, external and internal communication, individual and collective decision-making, coordinated responses, freedom to operate within the project structure, empowerment, responsibility and openness, are all important tools. Behaviour-readiness consists of planning, role assignments, responsibilities, as well as training and drill rehearsals. It is required to have the right people to take the right actions against risk. However, the information for taking risk response actions is useless if it is not communicated properly. (Smits & Ally, 2003) Ensuring team confidence and trust is vital, with a need for open and reliable communication between team members. Lack of trust between team members can raise disputes and turn the project risk into a project disaster. Trust and commitment naturally promote cooperation and leads to effective communication. (Doloi, 2009, p. 1100-1104) Therefore, these factors work together collectively in responding successfully to risks.

**3.5 Project manager’s role**

The project manager’s role is important for project success but it becomes critical when actions need to be taken to address project risks. Based on PMBoK (2004), five main responsibilities and skills required for project managers in day to day operations are identified but they become essential in responding towards risk or uncertain events:

**Leading**

Project managers, as leaders, perform three different functions: 1) Direction: develop the vision, purpose and plan for the project; 2) Motivate: help the team members in order to perform efficiently and guide them; and 3) Align the people: transform the vision to team members in the project so that they can clearly understand the purpose of the project.

**Communication**

Exchange of information between the project manager and team members is crucial. The sender has to send information clearly, and it has to be unambiguous information. This is so that the correct information is received at the receiver’s end.
**Negotiation**

Negotiation involves discussion with others in order to come to terms or reach an agreement. Negotiation occurs around many issues e.g. resources, scope of project, cost, quality and time.

**Problem solving**

Problem solving involves different steps like *problem definition* and *decision making*. For *problem definition*, we find out if the problem is internal or external, examine the reasons behind the problem and identify the type of problem (for example, is the problem of a technical nature, is it a managerial problem or of any other types?) As for *decision making*, we identify the solutions for the problem, consider the alternatives and choose the best option. Since it is not feasible to implement every option, it is necessary to choose the most suitable one. After the decision is implemented, it is evaluated to find out if the problem can be completely solved or further steps are required to be taken.

**Influencing the organization**

It is necessary to understand the structure of the organization, i.e. formal or informal, in order to get things done. The power structure and politics within the organization affect the performance of the project manager as well as the team members in terms of change in their behaviour—whether they will accept the change or resist it.

(PMBoK, 2004, p.15)

### 3.6 Construction industry

A primary activity of the construction industry is to build non-residential and residential buildings. There are a few important and basic components in this industry, i.e. the contractor and the supplier. Typically, the main contractors are government agencies or major private-sector customers, which are mostly firms rather than individuals. The contractors are in a strong position as they have the influence to define the constraints of the project. There are two forms of suppliers in this industry. Firstly, the suppliers can be the distributors of materials and components and secondly, they can be sub-contractors who provide specialized services needed for the completion of the project. (Anonyms, 2011, p. 12) Construction is a risky industry for many reasons, including poor records of adhering to cost and time objectives (Olawale & Sun, 2010, p. 518). Despite various control techniques employed by many construction companies, projects still do not achieve their cost and time objectives. In the construction industry, the aim of project control is to ensure that projects finish on time, within budget and specify high quality.

During the last few years, various project control methods, such as Gantt Bar Chart, Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM) have been used together with a variety of software packages such as Microsoft Project, Asta Power Project, Primavera, etc. to aid the accomplishment of project control. Although such extensive methods and software are used, there are still many construction projects which suffer from time and cost overruns. (Olawale & Sun, 2010, p. 509) With primary project components of time and cost being compromised, risks and uncertainties are naturally inherent in the construction industry and adversely affect construction projects. There are many different types of risk in construction industry, i.e. technological, economic, financial, political, environmental, legal, and operation risks. Due to number of risks and complexities faced by construction industry, thus, makes it pivotal to focus on risk management in order to manage risk in the construction industry. (El-
Adaway & Kandil, 2010, p. 3) For that reason, we have decided to study the construction sector in particular, with the knowledge that risks and uncertainty are abound herein. Moreover, our research on factors to cope successfully with risks and uncertainty in the construction industry will be very useful and benefit project managers in this sector.

3.7 Risk management in Construction industry

Organizations from many industries have acknowledged the growing significance of risk management, and most companies have established risk management departments to manage risks. The construction industry is widely associated with a high degree of risk due to the nature of business activities, operations, and environment. As aforementioned, risks in construction are important to be considered since time and cost over-runs are commonly associated with construction projects. Project objectives and constraints such as time, cost and quality can be adversely affected by risk. Hence, risk management is essential to the activities of construction industry. (Akintoye & MacLeod, 1997, p. 31)

Risk management is critical for the decision-making process in construction, and is an essential tool in project management. The ultimate purpose of risk management techniques is to ensure a smooth project delivery and increase its effectiveness in the construction industry. Dealing with risk is important as risk impact number of participants (stakeholders) such as project owner, sponsor, contractor, supplier, client, etc. who have particular and obvious concerns about the project success and outcomes. Risk management is about decision making which provides direction. A decision can be good or poor, depending on the credibility of information obtained by the decision maker. (Tang et al., 2007, p. 944) Construction industry is large and complex in nature and operation. Thus, there is exposure to many different types of risks, as mentioned earlier. A response strategy is therefore developed to reduce or prevent the occurrence of risk. Over time, as more and new risks are identified, it is necessary to update these risks and add new risk response strategies accordingly. This is done so that project managers would be better equipped to respond to these risks appropriately. Although risk response strategies are useful for project managers, risks can never be eliminated completely. As risks are associated with unpredictability of events and imperfect knowledge of reality (Choi & Mahadevan, 2008, p. 894), there will always be risks present in any project.

As aforementioned, construction projects often fail to achieve project objectives of time, budget and quality. When there are a large number of imminent projects, it is pivotal for a contractor to select the projects that are most suitable for the company. The chosen project must have good returns with minimum risk involved. A construction project is intricate and characterized by a number of uncertainties, which differ from project to project. However, as construction projects become more complex and difficult, and hence more risky, organizations are unable to respond to such risks effectively. (Nandi et al., 2011, p. 91) Research shows that almost 90% of construction projects experience financial overruns, and are not completed according to the planned budget (Le, Caldas, Gibson & Thole, 2009, p. 901). Construction projects are complex, so they are more prone to risks which could lead to project failure if not responded well. It is necessary to determine how much from the total budget of the project should be allocated to risks or how much increases in the total budget would be required to cope with these risks. Risks are ranked according to likelihood and severity. It is important that project managers should be aware about the severity of risks in order to decide on the resources required to take appropriate
steps to respond to the risks. (Imbeah & Guikema, 2009, p. 779) Construction projects lack an adequate understanding of the decision process under conditions of risk and uncertainty. When project practitioners of the construction industry in Hong Kong are asked to rank the risks that cause delay in projects; they highlight the risks which are beyond their organizational control, i.e. raw material and equipment delays, weather conditions, etc. instead of highlighting the risks that they are in control of them, for example, poor communication, lack of coordination, etc. (Edwards & Bowen, 1998, p. 346) However, to handle these risks that are outside of the organization control, human factors are needed to respond to the risks. Human factors consist of motivation, boldness, professional knowledge, judgment ability, values, interest in the project, etc. that play an important role in decision making. Human factors in fact influence the productivity of the project team and the projects in the organization. (Wang & Yuan, 2011, p. 214)

3.8 Sweden’s Construction sector
Swedish construction industry is divided into large, medium and small size companies. There is Swedish construction federation most of the construction companies are member of it. Swedish construction federation is acting as regulatory and organization for this industry. (Swedish construction federation, 2009) The construction sector in Sweden has for some time suffered from poor performance and a lack of control in projects. Due to the sector’s problems with numerous faults and the increased costs for buildings, the Swedish government initiated the Building Commission, whose assignment was to focus on where the problems were and how to increase the effectiveness instead of the costs. They found, amongst other things, problems with cost and faults related to the construction. Risks and other uncertainties can cause losses that lead to increased costs, time delays and lack of quality during the progression of the projects and at their end. Risks related to the work environment are highly regulated by laws and regulations. There are clear descriptions for what is to be done and by whom. (Simu, 2006)

3.9 Unexpected events and Types of uncertainty
Since no two projects are identical, variations from one project to another are expected to occur. Despite risk management efforts to identify many of these variations and provide for their mitigation, it is impossible to totally de-risk a project. Projects face a continuum of unexpected change varying from simple variations (or aleatory uncertainty) to chaos (or epistemic uncertainty). (De Meyer et al., 2002) Aleatory uncertainty can be likened to “known-unknowns”. This means that the variations are known but the chances or probability of them occurring need to be determined. Project managers are aware of such events that could arise in projects but would need to decide on whether to implement the required risk management processes. This decision could be dependent on the probability or chances of such risks happening. As for epistemic uncertainty, this can be referred to as “unknown-unknowns”. This type of uncertainty results from gaps in knowledge, whereby project managers are ignorant of such occurrences. Nevertheless, as it is not possible to predict all possible risks in projects, residual uncertainties will always be present. Unexpected events are the outcome of a range of residual uncertainties. (Geraldi et al., 2009) These concepts on uncertainty and unexpected events result in risks in projects. This is expressed when we carry out our study, by questioning project managers how they respond to uncertainty and unexpected events, and eventually to project risk. Figure 7 illustrates the progression from uncertainties to unexpected events to our research focus, which is the response success to these unexpected events.
3.10 Lessons Learned from unexpected events, uncertainty and risk

Two major lessons are involved in risk. First is that the human element is involved; people cannot totally prevent risks from occurring. No matter how much effort is taken to avoid risks, they are always inherent in projects in one form or other. Secondly, risk cannot discriminate the size of any project; all projects, regardless of being small, medium or large, are bound to contain some element of risk, although its nature and extent may vary according to project size. In addition, modifications to team formations in responding to uncertainty or unexpected events may develop. (Hällgren & Wilson, 2008, p. 831) According to researchers Engwall and Svenson (2001) and Pavlak (2004), three team formations have been identified in responding to problems arising within projects; the project teams themselves, tiger teams and cheetah teams. Tiger and cheetah teams are treated as ad hoc teams which are formed to deal with uncertain events that occur in projects. (Hällgren & Wilson, 2008, p. 837) Hence, the project team itself may not solely respond to risks. As and when unexpected events arise, the organization may call for the formation of these special teams to respond to the risks whilst the project team is focused on its daily work.

According to Geraldi et al. (2009, p. 553-554), the three most important pillars to successful response to unexpected events are responsive and functioning structure, good interpersonal relationship and competent people. Responsive and function structure is dealing with organizational level. Top management involvement, accessibility to resources, trained project team members, empowerment (allow them to decide and respond to risk on runtime), high
degree of freedom, time should spend productively to respond the risk not on sending daily reports to top management about what they have done, response structure should be flexible. Good interpersonal skills deal with group level construct. It includes negotiation with stakeholders including team members, client and sponsor for solution. Instead of top-down approach; bottom-up is considered more beneficial for risk response. Communication, relevance and flow of information, listening to and acknowledging team members are the most important tools for the group level to successfully respond to risks. Competence of people deals with the individual level. It consists of the team and leaders’ competency to respond to risks. Emotional control is another important factor when risk arises. Although risk can create panic and stress, it is required that project managers show professional guts in order to take over their emotional outbursts. It is necessary to respond to risk in a way that there should not be an over-reaction or under-reaction of behaviour. (Geraldi et al., 2009) Figure 8 below illustrates the three pillars to successful response to unexpected events.

Successful Response to Unexpected Events

<table>
<thead>
<tr>
<th>Organisational level</th>
<th>Group level</th>
<th>Individual level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsive and functioning structure</td>
<td>Good interpersonal relationship</td>
<td>Competent people</td>
</tr>
<tr>
<td>High degree of freedom</td>
<td>Engagement with stakeholders, including ability of negotiate solutions</td>
<td>Competence of leader and team</td>
</tr>
<tr>
<td>Pace to make and implement decisions</td>
<td>Communication, including availability of information as well as its communication</td>
<td>Behaviour, including self-awareness and ability to deal with stressful situation</td>
</tr>
</tbody>
</table>

Figure 8: Three pillars to successful response to unexpected events (Geraldi et al., 2009, p. 553)

This understanding of constructs for risk response success is crucial in our study. We have used these constructs as determined previously in defence-related projects to apply to construction projects. Hence, we are testing these same constructs and subsequently forming hypotheses to see if they contribute to risk response success in the construction industry as well. In view of the importance attached to the above three pillars, a summary of previous researchers’ work on responses to unexpected events at organizational, group and individual levels has been tabulated by Geraldi et al. (2009, p. 550). This is shown in Table 2 below:
<table>
<thead>
<tr>
<th>Focus</th>
<th>Source</th>
<th>Methodology</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project context</td>
<td></td>
<td></td>
<td>Preconceived beliefs and attitudes, level of uncertainty surrounding financial responsibility and pressure. Necessity but usual lack of teamwork and collective responsibility, effective communication and mutual sensitivity between project members</td>
</tr>
<tr>
<td>Individual and group level</td>
<td>Loosemore (1998a)</td>
<td>Case studies in construction projects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loosemore (1998b)</td>
<td>Case studies in construction projects</td>
<td></td>
</tr>
<tr>
<td>Group and organisational level</td>
<td>Söderholm (2008)</td>
<td>Four case studies of different project types in different industries</td>
<td>Most used practices were: Detaching strategies, setting up intensive meeting schedules and negotiating project conditions Cheetah organisations: Abrupt emergence of ad hoc organisations composed to solve unexpected problems. They are explicitly sanctioned, have full-time members, are action-oriented – accomplish a specific mission, and are smaller and more time limited than usual temporary organisations (the duration varies from 3 to 8 weeks) Remedies draw on internal as well as external sources of expertise, intensive communication and both formal and informal practices. Practices included mainly negotiations with client and subcontractors and re-planning and re-organising – including overtime and re-work Complementing traditional project management planning with attention to early warning signals. Sixty-eight types of early warnings including gut feelings, conflicts, indecision</td>
</tr>
<tr>
<td></td>
<td>Hällgren &amp; Wilson, (2008)</td>
<td>15 crises in construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nikander and Eloranta (2001)</td>
<td>Interviews and case studies in construction projects</td>
<td></td>
</tr>
<tr>
<td>General management</td>
<td>Individual and group level</td>
<td>Organisational level</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------</td>
<td>----------------------</td>
<td></td>
</tr>
</tbody>
</table>

Many studies in psychology, for example defensive mechanisms: shock, defensive, acknowledgement, adaptation (Fink et al., 1971), limited information processing capabilities, tendency for irrational and biased responses, shattered assumptions, victimisation (summarised by Pearson and Clair (1998)), threat rigidity theory – individuals, groups and organisations behave rigidly in threatening crisis situations (Chattopadhyay et al., 2001; George et al., 2006; Meszaros, 1999; Starbuck and Milliken, 1988; Staw et al., 1981)

Improvisation can be defined as “the conception of action as it unfolds, by an organization and/or its members, drawing on available material. Cognitive, affective and social resources” (Pina e Cunha et al., 1999). Often conceptualised around the Jazz metaphor, this concept had its peak in the 1990s and was considered a way to deal with unexpected events in situations such as meetings

Preparation to crisis developing an organisation from crisis prone to crisis prepared through identifying types of crisis, regarding early warnings, construct systems that enable, for example, facing faulty rationalisations and engaging with stakeholders (Pearson and Mitroff,1993)

An organisation that can adapt to and respond to crisis and develop from crisis to success (e.g. Hamel and Valikangas, 2003; Weick and Sutcliffe, 2001)

Source: (Geraldi et al., 2009, p. 550)

Risk always sounds negative but it contains something positive for organization; it provides the opportunity to learn from them. We considered risk that affects the critical path of project. As we know, projects are temporary in nature while organization is working on permanent basis so it is required to transfer learning from project to organization in order to successfully respond the risks. Organization should learn from their projects. It is required that organization, group and individual learn from project feedbacks about risks. Uncertain events create behavioural instability and conflict among members who are taking actions for risk. The better response to
risk represent that organization learns from preceding risks. (Hällgren & Wilson, 2011, p. 5) Mental, emotional and cognitive change is required in order to cope with fear and panic. Just funding for contingency plan is not enough but it is required to properly implement it. Planning is the roadmap to allocate responsibilities, roles, resources. Decision making for risk is not on evidence that management will not make wrong decisions it could be possible to take wrong steps. People are vital resources in risk preparedness; risk management can be improved by upgrading risk information and type. Timely information is important for project managers to take essential steps to respond to risk. (McConnell & Drennan, 2006)
3.11 Proposed Conceptual Model
Before we elaborate on the proposed factors for successful risk response in construction projects in Sweden, and the subsequent hypotheses for our study, we first construct our proposed conceptual model as shown in Figure 9 below.

**Figure 9: Proposed conceptual model**
3.11.1 Explanation of conceptual model

The aforementioned conceptual model contains three types of variables: independent, dependent and intervening variable. The purpose of conceptual model is to define variables, determine the relationship between variables, develop measure for variables, gathered data, and validate the measures and the model. (Ping, 2004, p. 125)

**Independent variable:** Independent variable is a variable which affects and explains the dependent variable. Increase and decrease in independent variable affect level of dependent variable. Independent variable refers to influenced by dependent variable. By reading extensive literature we find out that there are seven independent variables i.e. effective communication, active leadership, negotiation and coordination, team competency and skills, hierarchical structure, empowerment and behaviour.

**Dependent variable:** Dependent variable is a variable which depends on independent variable. Dependent variable is the variable which researcher wants to understand and explain. Any change in independent variable also causes change in dependent variable. The dependent variable is also called effect variable and is being influenced by the independent variable. Most of the time dependent variable is on right side of model. In our research project risk response success is dependent variable.

**Intervening variable:** These variables are acting like stand between and do not directly impact dependent variable and independent variable but affect their relationship. Intervening variables are influencing independent variables. In our study training, education, openness to opinion and trust and confidence are intervening variables.

(Creswell, 2004, p. 94; David & Sutton, 2011, p. 220; Hair et al., 2007, p. 145)

The + signs show that the independent variables have a positive direction and effect on the relationship with the dependent variable. From Fig. 8, it can be seen that all the independent variables have a positive impact on the dependent variable (project risk response success). This means that an increase in the independent variable will lead to an increase in project risk response success, and vice versa. Therefore, the + sign indicates an effect in the same direction. With the exception of hierarchical structure and behaviour, this is self-explanatory for the rest of the independent variables. For example, an increase in effective communication would mean that a higher level of communication effectiveness would lead to greater risk response success. Similarly, a decrease in empowerment would mean that the less empowerment there is, the lower the level of risk response success. However, owing to how we have termed the independent variables of hierarchical structure and behaviour, these two variables require a further elaboration so as to avoid any ambiguity in terms of the direction of impact of these variables on risk response success. As elaborated in section 3.11.5, which was also explained by Geraldi, Lee-Kelley and Kutsch (2009, p. 554) pertaining to what is meant by this construct, hierarchical structure as elaborated in section 3.11.5 indicates a structure that is flexible and able to respond quickly to changes. Hence, when we state that there is an increase in the hierarchical structure, by this we mean that there is an increase in the flexibility of the hierarchical structure. Thus, as implied in our conceptual model, the more flexible the hierarchical structure is, the greater the risk response success. The other independent variable that needs explained more precisely is
behaviour. As explained in section 3.11.7 and defined by previous authors (Geraldi, Lee-Kelley and Kutsch, 2009, p. 555; Greenberg & Baron, 2008, p. 146; and Müller & Turner, 2010; 2007), behaviour as a construct will be taken to mean emotional resilience, that is, being able to cope with stress, remaining calm, and not going into panic mode. Therefore, when we mention that there is decrease in behaviour, it will be taken to mean decrease in emotional resilience. Hence, as implied from our conceptual model, the less the emotional resilience there is, the lower the success of risk response.

As for the impact of the intervening variables, it will also be explained in the following sections. As discussed in section 3.13.2, trust and confidence is an intervening variable for effective communication. Openness to opinion is also a mediating factor on effective communication as explained in section 3.13.1. Training and education, as elaborated in section 3.13.3, has an intervening effect on team competency and skills.

The direction of the arrows illustrated in our conceptual model also plays an important role. The arrows from the intervening variables are pointed one way, towards their respective independent variables that they have a mediating effect on. This indicates that the impact of the intervening factors is on the respective independent variables. As their effect is not directly on the dependent variable, the arrows are not pointed towards risk response success. However, since risk response success is dependent on both the individual independent variables, as well as having taken into account the mediating effects of the intervening variables, this is reflected by a bold arrow pointing from a combined effect of all these variables (independent and intervening) towards the dependent variable. As proposed in the conceptual model, the above variables constitute the factors for successful risk response. These factors are further elaborated in the following section.

3.12 Dependent variable
3.12.1 Project risk response success
Project risk response success is dependent variable in our research since all independent variables affect and change success of project risk response. Risk is an uncertain event that can affect project objectives like cost, time, and quality. Most of the time researchers study risk management but not much work is done on risk response. Risk is inherited in every project and there is not a single project without having a risk. Risk response is the phase of risk management but most of the time attention is given to risk management’s other phases. Our study is amongst the first to figure out project risk response success factor in construction industry. Generally organizations think that uncertain event would not be happen with them but when it will happen organizations are not prepare to respond it. (Geraldi et al., 2009)

3.13 Independent variables
3.13.1 Effective communication
Most of time we find out effective communication is hidden element for success. The disposition of our research topic refers us to include this variable and to see its relationship with dependent variable of our proposed conceptual model. Open, reliable and frequent communication is pivotal for successful risk response. Effective communication is lifefood for any organization and project team. It is required that authentic and transparent information is shared at right time, right place and to right person. Flow of information, top down/downward and bottom up/upward
communication is important aspect to think about. Effective communication reduces conflicts; improve decision making and effect on team member performance. (Doloi, 2009, p.1104) The main issue is that most of the time essential information is not available to take right action so it is required to make communication most vital tool for risk response success (Moe & Pathranarakul, 2006, p. 410). Communication is a process through which a sender sends some information to a receiver. Sender and receiver could be an individual (project manager) and team (project members). Information can be send from different medium i.e. email, telephone, face-to face etc. Face to face communication is considered more important when there is sensitive issue and information is shared. Communication is useful for directing actions of team members, coordinate their efforts, and build good working relationship. (Greenberg & Baron, 2008, p.334)

As identified by Gerald, Lee-Kelley and Kutsch (2009, p. 554), the importance of communication and flow of information was stressed by the participants in the military projects. We would like to see if effective communication is also a success factor for risk response in construction projects as well. However, an irony of crisis management in construction projects as identified by Loosemore (1998) states that, although communication was of particular importance under uncertain conditions, it became less likely. The reasons given for this were that information was used as a source of power, and when crises arose, information became more closely guarded. Also, during crises, there is a high potential for information overload. This causes bottlenecks in the flow of information where too much information is distributed within a short period of time, thereby adversely affecting communication. This suggests that even though communication is considered important in managing uncertainty in construction projects, it may not be likely to happen. However, our paper focuses on the importance of success factors for risk response, and not the likelihood of putting such factors into practice. Nevertheless, we would like to get project managers’ views on whether they consider effective communication to be important to successful risk response in the construction industry, as opposed to keeping information to themselves and limiting the communication flow. Thus, we formulate our first set of hypothesis:

**Hypothesis Set 1- Effective communication**

**Hypothesis Set 1**

\(H_0: \) Effective communication is not a factor of risk response success in construction projects in Sweden

\(H_{1a}: \) Effective communication is a factor of risk response success in construction projects in Sweden

\(H_{1b}: \) Effective communication is important in risk response success in construction projects in Sweden

**3.13.2 Active leadership**

Most of the studies focus on leadership styles, behaviour and tactics. The risk response success required different kind of leadership from the normal routine project work. In risk response success we need active leaders that can take ad hoc actions on run time in order to avoid making situation worse. We believe active leader is one of the most important independent variable of our proposed conceptual model. The first priority of project leaders is to run project in
emergency situation as they run it in normal situation. (Simpkins, 2009) For active leadership to respond to risk event we need proactive leaders not reactive as proactive leaders set directions for project and reactive leaders try to solve the existing and foreseeable problems of projects. Proactive leaders are successful to complete the project within time and budget. Proactive leadership is required when some uncertain event is occurred. The proactive leader is firefighter whereas the reactive leader is firefighter. For project risk response success it is required to shift from reactive to proactive leadership. (Barber & Wan, 2005) Leader is a person who has power to influence others. Leadership is to influence other in order to accomplish certain goals. Leadership required followers; in our case leader would be project manager and follower would be project team members. Leaders should have capability to lead in stressful conditions, direct and guide their followers. Flexibility is also important, all risk are not same so response to each risk would be different in different situation and projects so leader could be able to change their action according to risk event. (Greenberg & Baron, 2008, p. 504)

This was another success factor identified in the study of defence organizations pertaining to risk response (Geraldi et al., 2009, p. 554-555). According to the authors, it was important for the team and the leader to “know what they were doing”, “having resources available with the right skills”, “providing the right resource in a timely manner” and “having cohesive teamwork”. Also, providing new direction after an unexpected event counted as clear leadership. (ibid, p. 554) Studies linking project success with leadership competencies (Müller & Turner, 2007; 2010) cannot be ignored, thereby emphasizing the impact that good leadership has on achieving project objectives. Although project success is not necessarily related to risk response success, we cannot undermine the importance of active leadership in coping with an unexpected event. Leadership competencies and styles of leadership, according to Dulewicz and Higgs (2003), stressed on leaders being “engaging”, “involving” and “goal oriented”. (Müller & Turner, 2010, p. 438-439) Based on the review of the positive relationships between leadership competencies and success in projects, we have decided to test the impact of active leadership in the construction industry when responding to uncertainty. Hence the formation of our second set of hypothesis is as follows:

**Hypothesis Set 2- Active leadership**

Hypothesis Set 2

$H_0$: Active leadership is not a factor of risk response success in construction projects in Sweden

$H_{2a}$: Active leadership is a factor of risk response success in construction projects in Sweden

$H_{2b}$: Active leadership is important in risk response success in construction projects in Sweden

### 3.13.3 Negotiation and coordination

Negotiation and coordination is mostly related with clients, sponsor and team members. It is essential to cooperate and negotiate with client and sponsor. Negotiation with client, team members and stakeholder is also considering the most important factor for risk response success. (Geraldi et al., 2009, p. 550-554) Stakeholders included clients, sponsor and team members; it is critical to take them in confidence when uncertain event occur and ensuring for successful outcomes. The effective coordination and collaboration is also pivotal in project risk response
success. Lack of coordination is one of the factors that cause problems toward appropriate risk response. (Moe & Pathranarakul, 2006, p. 408) It is vital to negotiate with customers and other stakeholders to assign more resources for project and inform them about the progress of project if needed then change project constraints i.e. time and budget in order to get quality outcome. (Söderholm, 2008, p. 85) It is essential that project team members cooperate with each other in order to handle risk. Most of the time stakeholders want to finish project according to preset project time and budget but uncertain event arise conflict between project practitioners (project managers and project team members). The conflict can be resolve from negotiation. Win-win negotiation is most applicable in this situation, in which both stakeholders and project practitioners get what they want. (Greenberg & Baron, 2008, p. 443)

Engagement with stakeholders played an important role in responding to unexpected events as identified by Gerald, Lee-Kelley and Kutsch (2009, p. 550-554) in the study of defence projects. Despite the extent of risk in any project, it is necessary to get all sides involved and ensure that they are aligned and committed in providing enough resources to solve the problem (ibid, p. 554). Besides engaging stakeholders, negotiating solutions with them is also a key characteristic in successful responses (Söderholm, 2008, p. 83-84). Proper coordination among the team members is much needed, especially more critical, in times of uncertainty as timing is essential. Many decisions may have to be made in a relatively short span of time. If there is a lack of coordination among the project team, there could be a likelihood that repetition of tasks may occur, or even overlooked, for that matter. Coordination is not only specific to the project team members; it also applies to clients, suppliers, etc. In others words, “everyone has to get on board” in dealing with the unexpected event. Although negotiation and coordination can be viewed as two distinct factors, we have classified these two terms simultaneously due to the similarities found between them. Both negotiation and coordination involve relationships between the people involved, and as we are examining the impact of good interpersonal relationships, we have classified both of them as one of the factors to be tested. Moreover, the term “interpersonal relationships” may be too broad, and for simplicity, we have decided to include negotiation and coordination under this umbrella. However, it is by no means exhaustive; that is, interpersonal relationships are not limited to refer to only these two terms. The importance of negotiation and coordination in risk response has led us to formulate the third set of hypothesis:

Hypothesis Set 3- Negotiation and coordination

Hypothesis Set 3

$H_0$: Negotiation and coordination is not a factor of risk response success in construction projects in Sweden

$H_{3a}$: Negotiation and coordination is a factor of risk response success in construction projects in Sweden

$H_{3b}$: Negotiation and coordination is important in risk response success in construction projects in Sweden

3.13.4 Team competency and skills
Team competency and skills is important variable to consider because it provides knowledgeable and technical human resource which is required to make risk response successful. Team
competency and skills is discussed in terms of skills, knowledge and attitude. Team dynamics are also linked with team competency what type of characteristic team have and what are the characteristics required for risk situation. It should be top priority of organization to make sure to educate project managers and project team members about the urgency of taking quick action. (Simpkins, 2009, p. 107) For risk response highly effective and trained people are required. Risk response cannot be effective without participation of project team members. Team members’ competencies and skills are important for risk response success. For that it is required to provide effective training to increase their competencies. (Moe & Pathranarakul, 2006, p. 409) Each individual have different abilities (capacity to perform different tasks) and skills (command on specific task, which has been acquired through training). Skills and competencies both are essential for project managers and team members in order to response to uncertain event. (Greenberg & Baron, 2008, p. 153) A team is a group of people that are working together for accomplishment of common goal and all team members are accountable for that. Project team is for temporary and finite time period when the project is ended the project team is also come to an end. To finish project according to preset time and budget, it is required to provide necessary skills to team members, this would be helpful for them to perform their task efficiently in normal as well as emergency situation. (Greenberg & Baron, 2008, p. 307)

A competent project team is not only a result of a competent leader. Competent team members are essential as well to ensure success in project risk response. Training is an important tool in building the skill level. As such, a well trained project team could be synonymous with a competent team. Having the right skills would be beneficial in responding to any uncertainty. In the case of the defence industry, it emerged that being able to trust the judgement of colleagues and their ability to resolve the situation is important. (Geraldi, Lee-Kelley & Kutsch, 2009, p. 554) However, according to Loosemore (1998, p. 141-142), an irony that surfaced during crises in construction projects is that, at a time when collective responsibility and teamwork are important, they are less likely. Reasons given for this phenomenon are that selfishness in attitudes arise during a crisis, whereby people considered themselves not be responsible if they were another party’s risk. In addition, differences in interpretation and misunderstandings emerged as well, that could be detrimental in arriving at mutually consensual solutions. (ibid, p. 141) Therefore, collective responsibility, teamwork, cooperation and support are acknowledged as being important in responding successfully to project risks, they are found to be less likely in occurrence under crises. However, the criticality in determining risk response success cannot be ignored. For simplicity, we have grouped these attributes under the factor of team competency and skills. This term, again is not exhaustive, and does not only include the attributes as mentioned. With the reviewed material, our fourth set of hypothesis is formulated as follows:

Hypothesis Set 4- Team competency and skills

Hypothesis Set 4

\[ H_0: \text{ Team competency and skills is not a factor of risk response success in construction projects in Sweden } \]

\[ H_{4a}: \text{ Team competency and skills is a factor of risk response success in construction projects in Sweden } \]
Hypothesis Set 5- Hierarchical structure

Hypothesis Set 5

H₀: Hierarchical structure is not a factor of risk response success in construction projects in Sweden

H₅a: Hierarchical structure is a factor of risk response success in construction projects in Sweden

H₅b: Hierarchical structure is important in risk response success in construction projects in Sweden
3.13.6 Empowerment
Risk response success requires empowerment as sometime reporting to top management make the situation worse as managers spend a lot of their time in informing top management, that time they can efficiently use to make project response risk successful. Empowerment is defined as “passing responsibilities from managers to employees”. (Greenberg & Baron, 2008, p. 475) Empowerment is required from all levels; operational personnel need to know how they can handle uncertain event, and leadership need to be involved so they know what is happening. In most organizations, most of the time operational personnel have to tell leaders what might go wrong which is time consuming and inefficient in emergency situation leads to delays in quick decisions. Good companies like Cisco Systems and Honda always listens and acts on the suggestions made by their workers. (Simpkins, 2009, p. 107) Empowerment leads to innovative and creative actions. Empowerment is to give power to employees in order to make decisions. (Greenberg & Baron, 2008, p. 387) We are trying to measure does project managers have freedom to take decisions when uncertain event happened.

According to Suchman (1987), empowerment refers to the shifting of responsibility and authority to people who are involved in that specific situation. This means that the key people who are in a project or handling a specific task are given the freedom to make decisions pertaining to what responses should be taken, how to do them, the choice of necessary resources for their budget, etc. Empowerment in taking actions was found to be an important factor in successful responses to unexpected events in defence organizations. (Geraldi et al., 2009, p. 553) A high level of empowerment given to any particular party could also be dependent on the competency and skills of that party (ibid). Therefore, we cannot discount the possibility that competency and empowerment could be related factors. However, we are not aiming to test the relationship between these two factors. Instead, we acknowledge the role that empowerment plays in dealing with unexpected events. As such, we would like to test if empowerment is similarly an important factor in the construction industry, pertaining to successful risk response. Thus, the formation of our sixth set of hypothesis is as follows:

**Hypothesis Set 6- Empowerment**

**Hypothesis Set 6**

\[ H_0: \text{Empowerment is not a factor of risk response success in construction projects in Sweden} \]

\[ H_{6a}: \text{Empowerment is a factor of risk response success in construction projects in Sweden} \]

\[ H_{6b}: \text{Empowerment is important in risk response success in construction projects in Sweden} \]

3.13.7 Behaviour
Behaviour is all about project practitioners’ behaviour at time when they meet with some unexpected event, how they can response to it. Human get stressed, feared and create panic when they meet with something uncertain which they never thought about. It is required to show courage, calmness and emotional stability in order to control situation. It is possible to handle stressful situation if project managers and team members do not over react and emotionally stressed. Human behaviour is an element which is mostly related negatively to risk response success. When people show courage and emotional stability in emergency situation it is resultant in successful response. (Geraldi et al., 2009, p. 549-552) It is essential to provide employees
environment in order to enhance their behaviour readiness for emergency situation. Behaviour readiness include that everyone should know about their role and responsibility, it become critical when something uncertain occur. It is required to not to show aggressive behaviour in uncertain situation. Emotional stability makes a person stable, secure and confidence; an individual who can control his emotion in stressful condition would be able to influence other people’s emotions. (Greenberg & Baron, 2008, p. 146) Emotion is reaction that shows the feelings about events. Emotions are always triggered as they have reason to activate and emotions are influenced by other people emotions with whom they interact most. The people those who can manage to handle their emotions are more successful and satisfied. Stress also leads to inefficient performance, more project managers are stressed it affect their efficiency to cope with uncertain event. ((Greenberg & Baron, 2008, p.146)

Behavioural theories span across many different disciplines, ranging from psychology to sociology to business areas like marketing and management, just to name several fields. In the context of this paper, we are limiting the behavioural aspect in risk response to being able to cope with stress, controlling one’s emotions and not going into panic mode when uncertainty arises. Borrowing the concept of “emotional quotient” (EQ), successful project leaders are those who have a high EQ. (Müller & Turner, 2010; 2007) According to the authors, some characteristics of emotional competencies are self-awareness, sensitivity, intuitiveness, emotional resilience, etc. Human behaviour issues, if not managed appropriately, can adversely affect the best of plans, structures and processes that are put in place. According to Geraldi, Lee-Kelley and Kutsch (2009, p. 555), “people lay at the heart of the response to unexpected events”. The authors have stated that inappropriate behaviour can have negative impacts on a ‘responsive and functioning structure’, cause interpersonal relationships to breakdown, and can downplay the competence of people. This could suggest that adverse human behavioural issues could lead to a failure in coping with uncertainty or unexpected situations, despite all other important success factors of risk response in place. This then begs the question of whether human behaviour is an important factor of successful risk response. As such, we will formulate our final set hypothesis (seventh set).

Hypothesis Set 7- Behaviour

Hypothesis Set 7

\[ H_0: \text{Human behaviour is not a factor of risk response success in construction projects in Sweden} \]

\[ H_{7a}: \text{Human behaviour is a factor of risk response success in construction projects in Sweden} \]

\[ H_{7b}: \text{Human behaviour is important in risk response success in construction projects in Sweden} \]

3.14 Conditions for hypotheses testing
For all the above-mentioned sets of hypotheses, \( H_0 \) indicates the null hypotheses which are opposite of the alternate hypotheses in terms of the relationship between the independent and dependent variables. Here, the alternative hypotheses are the rest of hypotheses which follow \( H_0 \). For each set, there are two alternate hypotheses (\( a \) and \( b \)). If the null hypothesis \( H_0 \) is rejected in any set, then we automatically accept hypothesis \( a \) of that set. The following hypothesis \( b \) in that
same set is then tested to see if we should reject it or accept it. This applies vice versa; if we accept the null hypothesis $H_0$ in any set, then we would automatically reject all the following alternate hypotheses of that set ($a$ and $b$). The testing of hypothesis $b$ in any set is conditional; it would be tested only if hypothesis $a$ of that same set is accepted.

3.15 Intervening variables
3.15.1 Openness to opinion
Openness to opinion is intervening variable and affects effective communication. Since when every one respect each other opinion it create friendly, open and accepted environment for everyone. It is important for project managers to say welcome to others’ opinion in order to get innovative and creative ideas which can be useful to response risk. Openness to opinion helps in generating and promoting new ideas. It is required to avoid criticizing and give value to other people opinion. Try to create friendly environment it would be helpful for project team members to share their opinion and feelings. (Greenberg & Baron, 2008, p.337, 408) If project managers show interest in new ideas, provide freedom of expression and friendly environment it will leads to openness to opinion and creativity. It is often called thinking outside the box. It would help team members and project managers to think differently and to be creative. (Greenberg & Baron, 2008, p. 564)

3.15.2 Trust and confidence
Trust and confidence is intervening variable which also affect the communication. So we include this variable in our research. Trust and confidence contribute and affect the relationship of effective communication and project risk response success. Lack of trust leads to disputes and arise conflicts in project practitioners. High level of trust and confidence improve communication. Importance of trust and confidence increased when project manager is facing uncertain event and it is helpful to strengthen relationship between leader (project manager) and followers (project team members). (Doloi, 2009, p. 1104) Trust resulting in effective communication between the project managers and team member. Trust shows the degree of confidence on each other. (Greenberg & Baron, 2008, p. 429)

3.15.3 Training and education
Training and education contributes to team competency and skills. Training program increases skills and abilities of HR. Team skills can be improved with training and education. Training and education is intervening variable and effect independent variable team competency and skills as well as dependent variable of project risk response success. Training and rehearsal is very important factor that contribute toward team competency and skills. Training is the process through which employees get specific knowledge and skills which help them to better perform their jobs. Training is the learning process to learn skills, it is required to use these skills as well in order to be efficient and optimize the performance. Training is not just to prepare project managers to meet new challenges but also to improve their skills as well. (Greenberg & Baron, 2008, p. 116) Training is also required to handle the stress during project when something unexpected happened. Meetings, exercise, simulations and drills are important to make project managers and team members capable to response risk successfully. (Greenberg & Baron, 2008, p. 332) It is considerably important to expand the capabilities of team members by guiding them through coaches and mentors.
4. Practical Methodology
In this chapter, research process design are discussed first, followed by research sample, sampling technique, sample size, respondents and data collection tools. Survey procedure and processing and analysis of data are also explained. Reliability and validity of data and ethical considerations are enlightened as well. The sampling and data collection process is explained thoroughly.

4.1 Research design process
The figure below (Figure 10) depicts the overall and major steps that as researchers we took in our research. Although it is general assumption that graphical and pictorial representation is much appreciated and easy to understand for readers. Researcher preconceptions included thinking phase of how we start to collect and evaluate data. The inauguration of new thing is always difficult and required clarity. Another starting point is extensive reading of literature review. This is helpful for us to understand the knowledge gap and to contribute to that very gap and also create better understanding of research topic. On the basis of literature review we come up with the research question and purpose of research in order to bridge the gap. We developed integrated model on the basis of what we have study in literature review and conceptual model to show where is the gap and what we are contributing in. We read different theories and concepts related to our topic. On the basis of previous steps we come up with proposed conceptual framework for our research topic.
The proposed framework is based on our literature review. We are able to find out variables and factors that can affect our research. To investigate our proposed conceptual framework we used questionnaire as data collection tool. We take project managers as respondents. The benefit of proposed conceptual framework is to be more specific in our research. In data analysis we used SPSS and applied tests which are appropriate for disposition of questions asked in questionnaire. In data analysis we find out significance of relationship and importance of variables, on the basis of that we revised our proposed conceptual model. This model contains the variables that are considered fatal by our respondents. Proposed conceptual framework is the root cause of this model and we bring amendments on the basis of responses we get from project managers. We
compared proposed conceptual model with revised conceptual model in order to bring improvement. The new model is based on data collection and data analysis and new model is more appropriate for our research.

4.2 Research Sample
Population is the element of study that is particularly interest to the researcher (Shiu et al., 2009, p. 450). “The universe of units from which the sample is driven called population” (Bryman, 2008, p. 168). As population has broader meaning. Population does not mean everyone, it refer to the group of people researcher claim to researching. (David & Sutton, 2011, p. 16) Target population is to select elements for investigation in the basis of research objective, feasibility and cost-effectiveness. Elements share common attributes. The target population, once defined is too large to investigate entirely. Target population is group of elements relevant to research and possess the information that research study want to collect. (Saunders et al., 2009, p. 210; Hair et al., 2007, p. 173) We selected project managers in Swedish Construction Companies as our target population. To produce some workable number of subjects sampling procedure is necessary. Sampling techniques provide methods to diminish amount of data to collect from sub-groups as it is impracticable to collect data from entire population. (Saunders et al., 2009, p. 212) Sampling is the process of selecting a sufficient number of elements from the population so that a study of the sample and an understanding of its characteristics would make it possible for us to generalize such characteristics to the population elements. Sample is a segment of population that is selected for investigation. There are two types of sampling techniques: probability and non probability sampling. The probability sampling represents population where each element/unit has known but not equal chance to be selected in the sample whereas non probability sampling has not been using random selection and unknown chances to be selected as element of study or not every unit of target population has chances to select in sample. (Bryman, 2008, p. 168; Rubin & Babbie, 1993, p. 224; Shiu et al., 2009; Hair et al., 2007, p. 174) Sample is very important as it determine on whom our research will be applicable. Sampling is the process to select small number of elements from larger group of elements which is called population. We consider that information gathered from small amount of elements represent the target population. Sampling is used where we can’t use census; it means to get response from every member of target population.

4.3 Sampling techniques
Since as authors of this study we intended to focus on construction companies operating in Sweden, here convenience sampling and snowball sampling techniques were used. In convenience sampling technique researcher take sample according to easy accessibility of units means sample are taken according to readily availability of units. This sampling technique is useful when researchers are exploring and undertaking new research. Convenience sampling is most widely used sampling technique where as snowball sampling technique is also called referral sampling. It is used where population is veil and difficult to identify. Snowball sampling is based on networking and it represent that initial respondents help researchers to identify additional people for their study; first it is required to make contact with one or two individuals, ask these individuals to refer other individuals that can be part of sample and continue the process until you obtained reasonable and required number of respondents. (Bryman, 2008, p. 183; Shiu et al., 2009, p. 480; Saunders et al., 2009, p. 240; David & Sutton, 2011, p. 231; Hair et al., 2007, p. 181) We included non probability (convenience sampling and snowball sampling)
techniques. We talked to HR managers in order to get access to project managers that are easily available and requested them to send our questionnaire to fellow project managers. The element/unit of analysis can be a person, group and organization but in our case individual is taken as unit of analysis by focusing on specific kind of individuals such as project managers. It is very important to be clear about unit of analysis. (Bryman & Bell, 2011, p. 69) In social research there is wide range of difference which is not relevant to topic but particular unit of analysis that show what and who is studied. Sometimes the study is limited to specific country. (Rubin & Babbie, 1993, p. 112) In our case the unit of analysis is individual as we are interested in project managers’ responses and these responses are limited to construction industry of Sweden.

4.4 Sample Size
For our study we sampled project managers in Swedish construction companies. There are 50 big construction companies in Sweden (Swedish Construction Federation, 2009). The list and contact details of these 50 construction companies were obtained from Swedish Construction Federation. We contacted all of them via email and telephone. Telephone calls were subsequently made to these companies which enabled us to send the questionnaires to the appropriate department and in addition, contact details of project managers of construction projects was gathered to ensure that the questionnaires were correctly addressed to the appropriate personnel. We found out that one company is reorganizing its employees, whereas six companies do not have the designation of project management while three companies did not want to share any kind of information with us. So we did not take these companies in our sample. Out of 40 companies, seven companies told us the number of project managers but they did not want to be part of our research. This means there are remaining 33 construction companies through which we can collect data. We did not find quick response through email so we started contacting companies by telephone mentioned on their websites. Our first main concern was to know the numbers of project managers working in construction industry of Sweden. Secondly, we wanted to get the list of their project managers in order to contact them directly and send questionnaire, due to this most of time we talked to human resource manager of the company. Some of them did not want to be part of our research but a large number of companies gave positive response. We tried to get the email address, contact numbers of project managers working in Swedish construction industry. Some of the companies mentioned their project managers’ details on their sites, while few companies were eager to know more about our projects so we sent our research topic details via email to them. Then, some of them provided us details of their project managers and some companies requested us to send our questionnaire that they will send to project managers by themselves. 40 companies that gave numbers of their project managers; approximate 1200 project managers were considered target population. We calculated the sample size through sample size calculator with confidence level of 95% and interval level of 5. Below is the formula to calculate sample size.

\[
SS = \frac{Z^2 \times p (1-p)}{C^2}
\]
Where SS is required sample size, Z standard value is 1.96 which is predefined at confidence level 95% p is estimated prevalence (25%) already given and C is margin of error at 5% (standard value of 0.05). (The Survey System, 2011) It showed that the sample size for our study is 291 project managers but we are aware that questionnaire via email is slow and response rate will be low, so we took 500 project managers as our sample. Due to time constraints, our aim was to get a sample size of 291 project managers in order to draw a sophisticated analysis.

4.5 Respondents
Respondents are persons providing response to questionnaire for data analysis. Respondents of our study are project managers in construction industry Sweden. We contacted 40 construction companies in Sweden to ask for their project managers’ information but 33 companies are willing to participate in our research. If the company was willing to share this information, we later tried to contact project managers and asked for their participation in our research. We sent our survey by an email with a link of questionnaire. Initially we planned to get around 291 responses from project managers.

4.6 Data collection tools (Questionnaire)
We collected data with primary as well as secondary sources. For secondary sources, we read scientific articles, conference papers and books to get clear idea and develop framework whereas the primary source of our research was to gather data from project managers working in construction companies in Sweden. For data collection, we found that a questionnaire would be the most appropriate tool for us to collect data of interest. We had thirty one questions in total, out of which thirty are close-ended questions and one is open-ended. We divided our questionnaire into eleven different sections:

1. Critical success factors for project risk response success (Q1-Q 25)
   a. Risk response (Q1-Q3)
   b. Effective Communication (Q4- Q8)
   c. Active leadership (Q9-Q12)
   d. Negotiation and coordination (Q13- Q15)
   e. Team competency and Skills (Q16-Q18)
   f. Hierarchical structure (Q19-Q21)
   g. Empowerment (Q22-Q23)
   h. Behaviour (Q24-Q25)
2. Success factors of project risk response ranking (Q26-Q27)
3. Comments (Q28)
4. Classification Questions (Q29-Q31)

The first part consisted of critical success factors for project risk response success. There were a number of questions in order to find out the relationship between independent and dependent variables of our study. The second part was a ranking scale and pre-coded for success factors of project risk response ranking. The third part was an open ended question to get comments from respondents. The last part is the classification questions which contained the demographics information of respondents. The questionnaire was combination of likert, semantic scale and category. Likert scale was used for most of the questions; there were few category and semantic scale questions as well.

The questionnaire is attached in appendix A. We had three kinds of data level: nominal, ordinal and interval data level in our questionnaire. We designed the questionnaire and sent it in English. We had anticipated that it would be difficult for us to get response from project managers in English as they may prefer to speak in Swedish. However, while talking to them, we felt that they are quite proficient in English, and from there, we believed that they were able to understand and respond in English. The aim of this study is to figure out the factors that could affect project risk response success in the construction industry of Sweden and the relative importance of these risk response factors. Response rate: We got back 258 filled questionnaires; 38 out of 258 questionnaires were not considered in our research as they were not properly filled. We discarded these 38 questionnaires as incomplete responses have an effect on our data analysis. Table 3 below illustrates the number of questionnaires and response rate that we attained.

<table>
<thead>
<tr>
<th>Questionnaire distributed</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire received</td>
<td>258</td>
</tr>
<tr>
<td>Response rate</td>
<td>52%</td>
</tr>
<tr>
<td>Questionnaire discarded</td>
<td>38, 8%</td>
</tr>
<tr>
<td>Questionnaire considered</td>
<td>220, 44%</td>
</tr>
</tbody>
</table>

4.7 Survey procedure

First we designed the questionnaire and then did its pilot testing. After doing pilot testing, we found out that we have to rephrase some questions to make it easy for our respondents to understand. The purpose of doing pilot testing is to make sure that questions are understood by respondents and data is useful to answer our research questions. We did some changes in our questionnaire. We decided to send it as attachment, which is a low cost and fast way to reach the target but the drawback is that we will get less response. For that reason, we sent approximately two hundred (209) questionnaires in addition as we had this in our mind that response rate through email will be low. We used Google docs to make our questionnaire and sent its link to project managers. It would be easy for them to select the options as well for us to understand their responses. The questionnaire was distributed from 15th April 2011 to 30th June 2011. The questionnaire was send by email in which we described the purpose of our research and the use of our study in the construction industry.
4.8 Processing and analysis of data
This section is related to how we collected data in our research. It depicts the processing and analysis of our data. For quantitative data we used SPSS and showed the results in graphical format to explain the relationship between independent and dependent variables. For data analysis we used SPSS and also applied both descriptive and inferential statistics. We applied SPSS tests that are aligned to our research and according to data types of questionnaire. First we edited the tables of SPSS by not using all values provided in SPSS tables, the information which is pivotal for our reader and supports our study is provided. Then we used graphs and charts to aid table values, increase the readability, make it easy and attractive for readers and support the research focus and objectives.

4.9 Quality Criteria
4.9.1 Reliability and validity of research
Reliability refers to the consistency of concept measure; it means that if the same technique applied repeatedly to same research setting resultant with same outcome. Reliability related to consistency of observations and is approached by taking repeated measures of same variables with similar method. (Rubin & Babbie, 1993, p. 168) According to Remenyi et al., (1993, p. 115) reliability is to get similar observation by researchers on different research setting to see how replicable the study is. Reliability is to test consistency of responses over time; respondents will give same response at different time. It allows detecting the difference and consistency in response. (David & Sutton, 2011, p. 266) McKinnon (1988, p. 36) stated that reliability answer the question that whether researcher can rely on obtained data or not. Validity refers to the exact measurement of concept which is tended to measures. Validity is to reveal that measuring instruments which is used to measure variables are really designed to measure variables. (David & Sutton, 2011, p. 268) According to Shiu et al., (2009, p. 278) “validity is the extent to which the conclusions drawn from the experiment are true”. Validity embody that the researcher is studying the phenomena he/ she claims to study and matched with research purpose and research questions. According to validity is David & Sutton (2011, p. 20) “closeness to fit between data and reality”. It was stated that validity is a concept measure which a researchers presume to measure in research. (Hair et al., 2007, p. 246)

A combination of primary data sources (questionnaire) and secondary data sources were used in this study. We considered that the reliability of results in this thesis is high. If the same study will be reiterate, in the same way and over the same time period as done in the thesis, the same results would be obtained. However, if a study will be conducted in future with different industry other than construction, the results might have changed. As we consider our study is sturdy in reliability so we considered the research to have a strong validity. The variables used in proposed conceptual model of the study have been tested in many scientific articles and studies but in different industries and in different context.

4.9.2 Generalizability of research
Generalizability (sometimes known as external validity) refers to the extent to which our findings may be equally applicable to other research settings, such as other organizations. It is concerned with whether our research results can be generalizable to all populations. (Saunders et al., 2009, p. 158) It is the extent to which research findings and conclusions from a study
conducted on a sample population can be applied to the population at large. We as researchers generalize the results of a survey of 220 project managers to the construction industry of Sweden population as a whole. Since we have contacted 40 companies and from there we set our target population i.e. 1200. But out of 40, 30 companies were part of our research. The research sample was 291 but we contacted 209 extra project managers in order to improve response rate. As we know that the larger the sample, the more one can generalize the results. We contacted almost 500 project managers although our sample size is 291 so it means that we approach more project managers then our required sample size so it means our sample size is justified in order to apply it to whole construction industry of Sweden. As we are able to use the findings from our sample to generalize to the whole population, generalizability of our research is therefore high.

4.10 Ethical consideration

In our research we considered three ethical steps which are pivotal for each research. First step is privacy; researchers protect privacy in storing and using the data they collected. It is important to respect the privacy of elements and units, researchers are researching. It is important to gain permission from participants and their consent to be part of study. It is also critical to clearly state purpose and use of research. Second step is confidentiality; it refers to where information is known by researcher but not disclosed, no one except researchers will able to identify the participants of study. Third step is anonymity which refers to situation where researcher doesn’t know the details of unit of analysis; no one will be able to identify the participants. (David & Sutton, 2011, p. 47, 211) It is also important to disclose the purpose of study with participants in order to make study understandable for participants (Hair et al., 2007, p. 68). We followed these three steps in our research. First for privacy we just send questionnaire to those project managers that are willing to fill it up, we mentioned the detail of undertaken study. Second for confidentiality we did not mention name of companies and project managers as we promise from companies at start of data collection that we will not mentioned company name in our research. To make sure that we are following autonomy we did not ask for company name and project managers name in our questionnaire. We accurately coded and process data in order to not left space for mistake. As researchers we did not force project managers to participate in our study we motivate and give incentive to them in order to participate in our research, that incentive is when our research would be completed we will share results of our research which would be fruitful for them to respond project risk successfully. In our research study we maintained privacy by remaining companies and project manager anonymous. We provided brief information to participants of our research in order to get clear about our research topic and its purpose.
5. **Data analysis, findings and result discussion**

The chapter contains the statistical tests that we applied on data collected from project managers. We use descriptive and inferential statistics for our data analysis. Descriptive statistics are used to provide an overview of our collected data whereas inferential statistics are used to test the hypotheses. We applied correlation, ANOVA, reliability and one-sample-t test. On the basis of these statistics, we discuss the results and findings of our study. The chapter ends with our revised conceptual model.

5.1 **Descriptive statistics**

With descriptive statistics, we want to describe what the data shows without implying or inferring anything beyond the sample characteristics. The descriptive analysis presents the data in graphical form which is helpful for readers to get the information on sample characteristics in just a glance. Descriptive statistics summarize the characteristic information of collected data. (Agresti & Finlay, 2007, p. 4; Kent, 2007, p. 297) It is beneficial as it allows us to obtain an understanding of descriptive data (Hair et al., 2007, p. 308) collected from our sample.

5.2 **Demographic information**

For our research study, we have gathered primary data via a structured questionnaire which includes some demographic questions. From these, we obtained information on the background particulars of our respondents such as gender, age and experience in the field of project management.

5.2.1 **Gender**

We had asked the gender of our respondents in our questionnaire. We gathered 220 responses from project managers of whom 60 are female and 160 are male respondents. This translates to our respondent group being made up of approximately 27% female and 73% male. Our sample size is thus dominated by male respondents (almost three quarters of the total number of project managers sampled). We have depicted this information by means of a pie chart. This pie chart together with the frequencies and percentages of the respective genders are illustrated in Table 4 below.
Table 4: Demographics by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>160</td>
<td>73%</td>
</tr>
<tr>
<td>Female</td>
<td>60</td>
<td>27%</td>
</tr>
</tbody>
</table>

5.2.2 Age
We have also asked our respondents for their ages. We have put the question on age in an open-ended manner, thereby not providing any options for age categories that they may select. Then, we recoded the ages from our collected data and presented the information by using bar charts. In the illustration below as depicted in Table 5, the bar chart, together with the frequency and percentage distribution of age categories, indicates that that 39 respondents (18%) fall into the age category of 25 to 34, 82 respondents (37%) fall into the ages of 35 to 44, 60 respondents (27%) come under the 45 to 54 age group and finally, 39 respondents (18%) come under the ages of 55 to 64. From this data collected, more than half (55%) of the project managers who have responded are from the ages of 35 to 54.
Table 5: Demographics by age

<table>
<thead>
<tr>
<th>Age of respondents</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 to 34</td>
<td>39</td>
<td>18%</td>
</tr>
<tr>
<td>35 to 44</td>
<td>82</td>
<td>37%</td>
</tr>
<tr>
<td>45 to 54</td>
<td>60</td>
<td>27%</td>
</tr>
<tr>
<td>55 to 64</td>
<td>39</td>
<td>18%</td>
</tr>
</tbody>
</table>

5.2.3 Experience in project management field
Another demographic characteristic that we wanted to find out is the number of years of experience our respondents have had in the field of project management. The following bar chart accompanied with the distribution of frequencies and percentages of the respective categories of number of years of experience, as shown in Table 6, indicates this information that we have gathered from our respondents. As presented, 137 respondents (62%) have had 1 to 10 years of experience in the field of project management, 75 respondents (34%) have had 11 to 20 years of project management experience and 8 project managers (4%) have had 21 to 30 years experience.
in this area. It can be seen that the majority of our respondents have had experience working in project management of 1 to 10 years.

Table 6: Demographics by experience in project management

<table>
<thead>
<tr>
<th>Experience</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 10</td>
<td>137</td>
<td>62%</td>
</tr>
<tr>
<td>11 to 20</td>
<td>75</td>
<td>34%</td>
</tr>
<tr>
<td>21 to 30</td>
<td>8</td>
<td>4%</td>
</tr>
</tbody>
</table>

5.3 Inferential statistics
With inferential statistics, we are trying to reach conclusions that extend beyond the immediate data gathered. For instance, we use inferential statistics to make judgments of the probability that whether an observed difference between groups is a dependable one or one that might have happened by chance in this study. Inferential statistics provide prophecies from collected data based on sample of population. (Agresti & Finlay, 2007, p. 4; Hair et al., 2007, p. 330)
According to Kent (2007, p. 360), inferential statistics are used to test hypothesis. In line with this view, the use of inferential statistics in our research is an important one since we are testing several hypotheses in order to answer our research questions.

### 5.3.1 ANOVA

The purpose of applying ANOVA is to determine if the means are statistically different from each other, and when a difference is identified, then it is statistically significant (Shiu et al., 2009, p. 592). It is used to confirm or reject the hypothesis on the basis of significance value. The selected significance level is .005 at 95% confidence level. According to Agresti and Finaly (2007, p. 373), F ratio is used to examine the difference/variance between the group means. The larger the difference is between the groups, the larger the F ratio is. The F ratio is used to explain if there is a significant difference between one or more groups. (Bryman & Cramer, 2005, p. 183) The larger the F ratio is, the more helpful or easier it is to reject the null hypothesis (Hair et al., 2007, p. 343). To make it easy it is essential that f-ratio value should be greater than 1 in order to reject null hypothesis. Moreover, F ratio is used to determine if the difference observed is meaningful.

### 5.3.2 Correlation

The correlation test shows significance value and range of coefficient. Pearson correlation represents the range of coefficient. According to Shiu et al., (2009, p. 555), the range of coefficient is to measure the strength of the relationship. Range of coefficient is ±.81 to ±1.00 (very strong), ±.61 to ±.80 (Strong), ±.41 to ±.60 (Moderate), ±.21 to ±.40 (Weak) and ±.00 to ±.20 (no relationship). It varies between -1.00 to 1.00; 0 represents no association while -1.00 or 1.00 represents perfect association between two variables. The higher the correlation value is, the stronger the relationship is. The correlation coefficient value can be either negative or positive; it indicates the direction of relationship between variables. A negative correlation coefficient indicates that an increase in the independent variable relates to a decrease in the dependent variable, and vice versa. A positive correlation coefficient shows that an increase/decrease in the independent variable relates similarly to an increase/decrease in the dependent variable. (Shiu et al., 2009 p. 554-555; Hair et al., 2007, p. 359) The relationship is significant if the significance value is not above .005 at 95% level of confidence.

### 5.3.3 Reliability

To measure the scale reliability in our questionnaire, we used Cronbach coefficient alpha. If the value of Cronbach alpha is equal to or higher than 0.7, it is sufficient to say that there is good internal scale reliability, although 0.5 is considered an acceptable value for Cronbach alpha. (Kent, 2007, p. 143)

### 5.4 Independent variables’ relationship with dependent variable

In our study we have seven independent variables, i.e. effective communication, active leadership, negotiation and coordination, team competency and skills, hierarchical structure, empowerment and behaviour. The dependent variable is project risk response success. We applied ANOVA and correlation test to find out the association between the independent and dependent variables and how strong that association is. We will test all the null hypotheses and the first of the alternate hypotheses (eg. $H_{1a}$, $H_{2a}$, etc.) for each independent variable to see if
these variables are a factor of the independent variable, or otherwise. Subsequently, we will test the second of all the alternate hypotheses (eg. $H_{1b}, H_{2b}$, etc.).

5.4.1 Testing of Effective communication

$H_0$: Effective communication is not a factor of risk response success in construction projects in Sweden

$H_{1a}$: Effective communication is a factor of risk response success in construction projects in Sweden

Table 7: F ratio of Effective communication

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F ratio</td>
</tr>
<tr>
<td>Effective Communication</td>
<td>5.59</td>
</tr>
</tbody>
</table>

We applied Analysis of variance (ANOVA) to find out if our hypothesis is true or false. As shown in Table 7 above, the P-value is significant at .000 and mean difference is 5.59. So in this case, effective communication affects project risk response success. Hence, the alternate hypothesis ($H_{1a}$) is accepted whereas the null hypothesis ($H_0$) is rejected.

Table 8: Correlation value of Effective communication

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation (r value)</td>
</tr>
<tr>
<td>Effective communication</td>
<td>.62</td>
</tr>
</tbody>
</table>

As seen in Table 8 above, the P-value is .000, which is significant at confidence level of 95%. This represents that there is a relationship between effective communication and project risk response success. The correlation coefficient value is .62, which shows that the association between effective communication and project risk response success is strong. The coefficient value is also positive, which symbolizes that an increase in effective communication will increase project risk response success. Therefore, this confirms that we accept $H_{1a}$ and reject $H_0$. 
Figure 11: Scatter diagram of Effective communication

The scatter diagram above (Figure 11) indicates that there is a positive relationship between effective communication and project risk response success. The scatter diagram also represents that there is strong relationship between effective communication and project risk response success. The greater the scatter, which can be seen as the more space between the dots, the weaker the relationship is. On the other hand, if there is less scatter or the closer spaced the dots are to one another, the stronger the relationship (Bryman & Cramer, 2005, p. 218). The value of Cronbach alpha for effective communication is 0.83. This value is higher than 0.7, which means that the scale is internally reliable.

5.4.2 Testing of Active leadership

\( H_0: \) Active leadership is not a factor of risk response success in construction projects in Sweden

\( H_{2a}: \) Active leadership is a factor of risk response success in construction projects in Sweden
Table 9: F ratio of Active leadership

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
<th>F ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Leadership</td>
<td></td>
<td>7.35</td>
<td>.000</td>
</tr>
</tbody>
</table>

As illustrated in Table 9 above, the significance value for active leadership is .000 at F ratio 7.35. This means that the alternate hypothesis (H$_{2a}$) is confirmed and null hypothesis (H$_{0}$) is rejected. Thus, active leadership has a relationship with project risk response success.

Table 10: Correlation value of Active leadership

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
<th>Pearson correlation (r value)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active leadership</td>
<td></td>
<td>.63</td>
<td>.000</td>
</tr>
</tbody>
</table>

As stated in Table 10 above, the P-value is .000, which is significant at confidence level of 95%. So, there is a relationship between active leadership and project risk response success but we need to know the intensity of that relationship using correlation coefficient value. Correlation coefficient value is .63, which indicates that the association between active leadership and project risk response success is strong. The coefficient value is also positive which means that an increase in active leadership leads to an increase in project risk response success. Hence, this confirms that H$_{2a}$ is accepted and H$_{0}$ is rejected. The scatter diagram below helps to explain it.
The scatter diagram above (Figure 12) represents a positive relationship between active leadership and project risk response success. The diagram also represents that there is a strong relationship between active leadership and project risk response success. The value of Cronbach alpha for active leadership is 0.65. This shows that the scale is acceptable as the alpha value is higher than 0.5 but not sufficiently reliable.

### 5.4.3 Testing of Negotiation and Coordination

\( H_0: \) Negotiation and coordination is not a factor of risk response success in construction projects in Sweden  
\( H_{3a}: \) Negotiation and coordination is a factor of risk response success in construction projects in Sweden

### Table 11: F ratio of Negotiation and Coordination

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F ratio</td>
</tr>
<tr>
<td>Negotiation and Coordination</td>
<td>3.49</td>
</tr>
</tbody>
</table>
As shown in Table 11 above, the significance value for negotiation and coordination is .000 at 95% confident level and F ratio is 3.49. This means that the alternate hypothesis ($H_{3a}$) is true and that the null hypothesis ($H_0$) is false. Negotiation and coordination is therefore associated with project risk response success.

**Table 12: Correlation value of Negotiation and Coordination**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation (r value)</td>
</tr>
<tr>
<td>Negotiation and coordination</td>
<td>.66</td>
</tr>
</tbody>
</table>

As seen in Table 12 above, the P-value is .000, which is significant. This represents that negotiation and coordination, is related to project risk response success. Correlation coefficient value is .66, which represents a strong relationship between negotiation and coordination, and project risk response success. The coefficient value is also positive, which denotes that an increase/decrease in negotiation and coordination similarly leads to an increase/decrease in project risk response success. Thus, $H_{3a}$ is accepted and $H_0$ is rejected.

**Figure 13: Scatter diagram of Negotiation and coordination**

The above scatter diagram (Figure 13) shows a positive and strong relationship between negotiation and coordination, and project risk response success. The value of Cronbach alpha for negotiation and coordination is 0.72, which means that scale is internally reliable.
5.4.4 Testing of team competency and skills

H₀:  Team competency and skills is not a factor of risk response success in construction projects in Sweden
H₄ₐ:  Team competency and skills is a factor of risk response success in construction projects in Sweden

Table 13: F ratio of Team competency and skills

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F ratio</td>
</tr>
<tr>
<td>Team competency and skills</td>
<td>6.27</td>
</tr>
</tbody>
</table>

As illustrated in Table 13 above, the significance value for team competency and skills is .000 and value of F ratio is 6.27. This means that the alternate hypothesis (H₄ₐ) is accepted and that null hypothesis (H₀) is rejected. Team competency and skills is thus associated with project risk response success.

Table 14: Correlation value of team competency and skills

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation (r value)</td>
</tr>
<tr>
<td>Team competency and skills</td>
<td>.73</td>
</tr>
</tbody>
</table>

As depicted in Table 14 above, the P-value is .000, which is significant at confidence level 95%. This represents a relationship between team competency and skills and project risk response success. Correlation coefficient value is .73, which represents a strong relationship between team competency and skills and project risk response success. The coefficient value is also positive, which shows that an increase in team competency and skills leads to an increase in project risk response success. This confirms that we accept H₄ₐ and reject H₀.
The above scatter diagram (Figure 14) represents a positive and strong relationship between team competency and skills and project risk response success. The value of Cronbach alpha for team competency and skills is 0.76. As Cronbach alpha is considered significant at 0.7, this means that the scale has internal reliability.

5.4.5 Testing of Hierarchical structure

H₀: Hierarchical structure is not a factor of risk response success in construction projects in Sweden

H₅a: Hierarchical structure is a factor of risk response success in construction projects in Sweden

Table 15: F ratio of Hierarchical structure

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F ratio</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>7.16</td>
</tr>
</tbody>
</table>

As stated in Table 15 above, the significance value for hierarchical structure is .000 and F statistic is 7.16. This indicates that the null hypothesis (H₀) is false and that the alternate hypothesis (H₅a) is true. Therefore, hierarchical structure affects the dependent variable, i.e. project risk response success.
Table 16: Correlation value of Hierarchical structure

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation (r value)</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>.53</td>
</tr>
</tbody>
</table>

As shown in Table 16 above, the P-value is .000, which is significant. Thus, it depicts that there is a relationship between hierarchical structure and project risk response success. Correlation coefficient value is .53, which represents a moderate relationship between hierarchical structure and project risk response success. The coefficient value is also positive, which denotes that an increase in hierarchical structure, or more specifically, an increase in the flexibility of hierarchical structure will lead to an increase in project risk response success. Hence, $H_{5a}$ is accepted and $H_0$ is rejected.

![Figure 15: Scatter diagram of Hierarchical structure](image)

The above scatter diagram (Figure 15) shows a positive and moderate relationship between hierarchical structure and project risk response success. The value of Cronbach alpha for hierarchical structure is 0.67. Significance value of Cronbach alpha is 0.7 but if alpha value is above 0.5, then it is considered acceptable. As such, the internal reliability of the scale used for hierarchical structure is acceptable although not sufficiently reliable.
5.4.6 Testing of Empowerment

$H_0$: Empowerment is not a factor of risk response success in construction projects in Sweden

$H_{0a}$: Empowerment is a factor of risk response success in construction projects in Sweden

Table 17: F ratio of Empowerment

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F ratio</td>
</tr>
<tr>
<td>Empowerment</td>
<td>4.62</td>
</tr>
</tbody>
</table>

As illustrated in Table 17 above, the significance value for empowerment is .001, which is significant at 95% confidence interval and F ratio 4.62. This denotes that the alternate hypothesis ($H_{0a}$) is true and that null hypothesis ($H_0$) is false. Empowerment therefore has a relationship with our dependent variable, i.e. project risk response success.

Table 18: Correlation value of Empowerment

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation (r value)</td>
</tr>
<tr>
<td>Empowerment</td>
<td>.58</td>
</tr>
</tbody>
</table>

As depicted in Table 18 above, the P-value is .000, which is significant. It indicates that there is a relationship between empowerment and project risk response success. Correlation coefficient value is .58, which depicts a moderate relationship between empowerment and project risk response success. The coefficient value is also positive, which represents that an increase/decrease in empowerment similarly leads to an increase/decrease in project risk response success. Therefore, $H_{0a}$ is accepted and $H_0$ is rejected.
The above scatter diagram (Figure 16) shows the direction and strength of the relationship between empowerment and project risk response success. The direction is positive and the relationship between empowerment and project risk response success is moderate. The value of Cronbach alpha for empowerment is 0.52. Significance value of Cronbach alpha is 0.7 but if alpha value is above 0.5, it is considered acceptable. So, whilst not sufficiently reliable, the internal scale reliability is nevertheless acceptable.

5.4.7 Testing of Behaviour

$H_0$: Behaviour is not a factor of risk response success in construction projects in Sweden

$H_{7a}$: Behaviour is a factor of risk response success in construction projects in Sweden

Table 19: F ratio of Behaviour

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F ratio</td>
</tr>
<tr>
<td>Behaviour</td>
<td>4.42</td>
</tr>
</tbody>
</table>

As stated in Table 19 above, the P-value for behaviour is .001, which is significant and F ratio is 4.42. This indicates that the alternate hypothesis ($H_{7a}$) is true and that the null hypothesis ($H_0$) is false. Thus, behaviour is associated with project risk response success.
Table 20: Correlation value of Behaviour

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation (r value)</td>
</tr>
<tr>
<td>Behaviour</td>
<td>.21</td>
</tr>
</tbody>
</table>

As shown in Table 20 above, the P-value is .002, which is significant at confidence level 95%. Therefore, there is a relationship between behaviour and project risk response success. Correlation coefficient value is .21, which represents a weak relationship between behaviour and project risk response success. The coefficient value is also positive, which depicts that an increase/decrease in behaviour in terms of emotional resilience similarly leads to an increase/decrease in project risk response success. This confirms that we accept $H_{7a}$ and reject $H_0$.

Figure 17: Scatter diagram of Behaviour

As represented in the above scatter diagram (Figure 17), the direction of the relationship between behaviour and project risk response success is positive. The value of Cronbach alpha for behaviour is 0.61. Significance value of Cronbach alpha is 0.7 but if alpha value is above 0.5, it is considered acceptable. Hence, the internal reliability of the scale is acceptable but not sufficiently reliable.
5.5 Helicopter view
5.5.1 Analysis of variance (ANOVA)

Table 21: Helicopter view of F ratios

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F ratio</td>
</tr>
<tr>
<td>Effective Communication</td>
<td>5.59</td>
</tr>
<tr>
<td>Active Leadership</td>
<td>7.35</td>
</tr>
<tr>
<td>Negotiation and Coordination</td>
<td>3.49</td>
</tr>
<tr>
<td>Team competency and skills</td>
<td>6.27</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>7.16</td>
</tr>
<tr>
<td>Empowerment</td>
<td>4.62</td>
</tr>
<tr>
<td>Behaviour</td>
<td>4.42</td>
</tr>
</tbody>
</table>

The above table (Table 21) gives a summary of the ANOVA results, illustrating the F ratio and corresponding significance P-value for the relationship of each of the independent variables with project risk response success. As seen here, active leadership has the highest F ratio at 7.35 at significance level .000. This depicts that active leadership has comparatively the largest difference between the group means and this difference is statistically significant. Moreover, this implies that among all the null hypotheses representing the various independent variables, it is the easiest to reject H₀ for active leadership. On the other hand, behaviour has the lowest F ratio of 4.42 at significance level .001. This denotes that behaviour has comparatively the smallest difference between the group means but this difference is still statistically significant. However, among all the null hypotheses, it is the most difficult to reject H₀ for behaviour. Overall, as all the independent variables have a relationship with risk response success, all the first of alternate hypotheses (a) have been accepted, and all the null hypotheses have been rejected.

5.5.2 Correlation (Multiple item scale)

Table 22: Helicopter view of Correlation values

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Project risk response success (Dependent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation (r value)</td>
</tr>
<tr>
<td>Effective communication</td>
<td>.62</td>
</tr>
<tr>
<td>Active leadership</td>
<td>.63</td>
</tr>
<tr>
<td>Negotiation and coordination</td>
<td>.66</td>
</tr>
<tr>
<td>Team competency and skills</td>
<td>.73</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>.53</td>
</tr>
<tr>
<td>Empowerment</td>
<td>.58</td>
</tr>
<tr>
<td>Behaviour</td>
<td>.21</td>
</tr>
</tbody>
</table>

The above table (Table 22) summarizes our results on correlation tests, stating the Pearson correlation r-value and corresponding significance P-value for the relationship of each of the independent variables with project risk response success. As shown, the r-value is highest for
team competency and skills at .73, with a significance level of .000. This means that, out of all the independent factors, team competency and skills has the strongest relationship with risk response success. On the other hand, the r-value is lowest for behaviour at .21, with significance level of .002. This means that, out of all the independent factors, behaviour has the weakest relationship with risk response success. In addition, all the coefficients of the r values are positive, indicating that the direction of the relationship between the independent variables and risk response success is positive. An increase/decrease in each of the above independent variable would similarly impact on an increase/decrease in risk response success. Thus, overall, we accept all the first of the alternate hypotheses (a), thereby rejecting all the null hypotheses.

5.5.3 Reliability of questionnaire and scales
As depicted in Table 23 below, the overall reliability of our questionnaire is 0.71. This is done by considering Q1 to Q27 in our questionnaire. It is very significant as 0.7 is considered significant for Cronbach alpha. This Cronbach alpha test is used to check the reliability of questions researcher asked from respondents. For multiple item scale variables Cronbach alpha value is 0.84. This is achieved by taking into account only Q1 to Q25 in our questionnaire. This value is also considered significant. Hair et al. (2007, p. 237) multiple item scale consist of numbers of related individual questions/ items whose response are combined to measure the concept. The purpose of multiple item scale is to combine items to make one construct or it could be explained like this that multiple item scale collects data on several characteristics of construct. For single item scale variable we also applied reliability tests. It is to collect data on one attribute of construct. (Shiu et al., 2009, p. 437)

Table 23: Reliability of questionnaire’s scales

<table>
<thead>
<tr>
<th></th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire</td>
<td>0.71</td>
</tr>
<tr>
<td>Multiple item scale</td>
<td>0.84</td>
</tr>
</tbody>
</table>

As depicted in Table 24 below, it shows a summary of the Cronbach’s alpha for each of the variables. The internal scale reliability is the most significant for effective communication at 0.83. On the other hand, the internal scale reliability is the least significant for empowerment at 0.52. Although not significant, the scale is nevertheless acceptable still.

Table 24: Reliability of variables’ scales

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project risk response success</td>
<td>0.81</td>
</tr>
<tr>
<td>Effective communication</td>
<td>0.83</td>
</tr>
<tr>
<td>Active leadership</td>
<td>0.65</td>
</tr>
<tr>
<td>Negotiation and coordination</td>
<td>0.72</td>
</tr>
<tr>
<td>Team competency and skills</td>
<td>0.76</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>0.67</td>
</tr>
<tr>
<td>Empowerment</td>
<td>0.52</td>
</tr>
<tr>
<td>Behaviour</td>
<td>0.61</td>
</tr>
</tbody>
</table>
5.6 Intervening variables’ relationship with independent and dependent variables

In our study we identified three intervening variables: trust and confidence, openness to opinion, training and education. Trust and confidence and openness to opinion are linked with our independent variable effective communication whereas training and education is linked with team competency and skills. The characteristic of intervening variable is that it affects the relationship between dependent and independent variables.

5.6.1 Testing of Trust and confidence

Table 25: Correlation of Trust and Confidence

<table>
<thead>
<tr>
<th>Trust and confidence question</th>
<th>Effective communication</th>
<th>Project risk response success</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation</td>
<td>P-value</td>
</tr>
<tr>
<td>Trust and confidence in the project team can increase the impact of effective communication on risk response success:</td>
<td>.8</td>
<td>.000</td>
</tr>
</tbody>
</table>

As seen in Table 25 above, we find the correlation of trust and confidence with project risk response success and effective communication. Question 8 is asking for trust and confidence phenomena. When we applied correlation test we find out that trust and confidence contains significance value .000 for both project risk response success and effective communication. It means that trust and confidence impact effective communication as well as project risk response success. The range of coefficient is different; trust and confidence coefficient value with effective communication is .8 and its coefficient value with project risk response success is .35. According to the range of coefficient it represents that trust and confidence relationship with effective communication is strong (.8 coefficient) where as the relationship between trust and confidence and project risk response success is weak (.35 coefficient). The coefficient value is positive so it means that increase/decrease in trust and confidence can increase/decrease effective communication and project risk response success.
5.6.2 Testing of Openness to opinion

Table 26: Correlation of Openness to opinion

<table>
<thead>
<tr>
<th>Openness to opinion</th>
<th>Effective communication</th>
<th>Project risk response success</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation</td>
<td>P-value</td>
</tr>
<tr>
<td>Openness to opinion</td>
<td>.9</td>
<td>.000</td>
</tr>
</tbody>
</table>

As illustrated in Table 26 above, we find the relationship between openness to opinion with project risk response success and effective communication. Question 5 and 7 both are related to openness to opinion so we compute these two questions to integrate it in one variable which is openness to opinion. When we applied correlation test we find out that openness to opinion contains significance value .000 for both project risk response success and effective communication. It means that openness to opinion has impact on effective communication as well as on project risk response success. The range of coefficient is different for effective communication and project risk response success. The range of coefficient value with effective communication is .9 and its coefficient value with project risk response success is .34. According to the range of coefficient it represents that openness to opinion relationship with effective communication is very strong (.9 coefficient) whereas the relationship between openness to opinion and project risk response success is weak (.34 coefficient). The range of coefficient is positive so increase/decrease in openness to opinion will lead to increase/decrease in effective communication and project risk response success.

5.6.3 Testing of Training and education

Table 27: Correlation of Training and education

<table>
<thead>
<tr>
<th>Training and education question</th>
<th>Team competency and skills</th>
<th>Project risk response success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there training sessions conducted to prepare the project team for risk response?</td>
<td>.65</td>
<td>.000</td>
</tr>
</tbody>
</table>

As depicted in Table 27 above, Question 17 is asking for training and education. When we applied correlation test we find out that training and education contains significance value .000 for both project risk response success and team competency and skills. It means that training and education affects team competency and skills as well as project risk response success. The range of coefficient is different for value with team competency and skills is .65 and its coefficient value with project risk response success is .32. According to the range of coefficient it represents that training and education relationship with team competency and skills is strong (.65 coefficient) whereas the relationship between training and education and project risk response success is weak (.32 coefficient).
success is moderate (.42 coefficient). The correlation coefficient value is positive which indicates that increase in training session will lead to team competency and skills and project risk response success while decrease in training session can resultant in incompetent team and risk response failure.

5.7 Relative importance of independent variables
To find out the importance of independent variables we applied one-sample t-test. This is conducted for the testing of the second of all of our alternate hypotheses (b). The results are shown as follows:

5.7.1 One-sample t-test on independent variables

Table 28: One sample t-test of independent variables

<table>
<thead>
<tr>
<th>Statements (One-sample t-test)</th>
<th>Test value =5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statements</td>
<td>Mean</td>
</tr>
<tr>
<td>Effective communication impacts risk response success</td>
<td>4.29</td>
</tr>
<tr>
<td>Active leadership impacts risk response success</td>
<td>4.4</td>
</tr>
<tr>
<td>Negotiation and coordination impact risk response success</td>
<td>4.4</td>
</tr>
<tr>
<td>Team competency and skills impact risk response success</td>
<td>4.44</td>
</tr>
<tr>
<td>Hierarchical structure impacts risk response success</td>
<td>4</td>
</tr>
<tr>
<td>Empowerment impacts risk response success</td>
<td>4.02</td>
</tr>
<tr>
<td>Behaviour impacts risk response success</td>
<td>4.34</td>
</tr>
</tbody>
</table>

As referred to in Table 28 above, Question number 26 contains statements and we test the statements by applying one-sample t-test. Mean is the average of responses we collected and according to Bryman & Cramer stated it as “measuring of average distribution” (2005, p. 101). Test value is 5 which mean that against value 5 we want to compare respondent answers. Effective communication is significant at .000 with mean of 4.29; it show that mean of 4.29 is higher than the midpoint of 3 on the five point scale, thus we conclude that effective communication affects project risk response success. Active leadership having mean 4.4 at significance level .000, it depicts that active leadership also impacts on project risk response success. Negotiation and coordination also have mean 4.4 with significance of .000 thus we can conclude that negotiation and coordination affects project risk response success. Team competency and skills contain mean 4.44 with significance level .000 it shows that team competency and skills has impact on project risk response success. Mean for hierarchical structure is 4 at significance level of .000 so it affects project risk response success. Empowerment contains mean 4.02 and significance of .000 the mean is higher than the midpoint so it show that project risk response success is affected by empowerment. Behaviour has mean
4.34 with significance level .000; it also affects the dependent variable which is project risk response success. On the other hand the mean value represents that for all variables there is area of improvement as the highest value is 5 for all statements. So this also proves that alternative hypothesis for all variables are true and now we are going to test relative importance of all variables by testing our second alternative hypothesis.

\[ H_{1b}: \text{Effective communication is important in risk response success in construction projects in Sweden} \]
\[ H_{2b}: \text{Active leadership is important in risk response success in construction projects in Sweden} \]
\[ H_{3b}: \text{Negotiation and coordination is important in risk response success in construction projects in Sweden} \]
\[ H_{4b}: \text{Team competency and skills is important in risk response success in construction projects in Sweden} \]
\[ H_{5b}: \text{Hierarchical structure is important in risk response success in construction projects in Sweden} \]
\[ H_{6b}: \text{Empowerment is important in risk response success in construction projects in Sweden} \]
\[ H_{7b}: \text{Behaviour is important in risk response success in construction projects in Sweden} \]

### Table 29: Ranking of independent variables

<table>
<thead>
<tr>
<th>How would you rank the following factors, according to importance, of successful project risk response?</th>
<th>Test value=6</th>
<th>Mean</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective communication</td>
<td>4.64</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Active leadership</td>
<td>4.38</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Negotiation and coordination</td>
<td>4.05</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Team competency and skills</td>
<td>5.03</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>3.48</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Empowerment</td>
<td>3.06</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Behaviour</td>
<td>3.37</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

As referred to Table 29 above, Question number 27 is to counter check question number 26 and find out the relevant importance of each independent variable. This is ranking question contain scale from point 1 to 7. Test value is 6. It means that against value 6 we want to compare respondent answers. Effective communication is significant at .000 with mean of 4.64; it represents that effective communication is important element that affect project risk response success as the mean value is above then midpoint 4 on the 7 point scale. Active leadership having mean 4.38 at significance level .000 thus we can conclude that active leadership is important as well for project risk response success. Negotiation and coordination also have mean 4.05 with significance of .000 therefore it means that negotiation and coordination is critical for project risk response success. Team competency and skills contain mean 5.03 with significance
level .000 thus it represent that team competency is necessary for project risk response success. Mean for hierarchical structure is 3.48 at significance level of .000 so it is important as well for our dependent variable. But the mean value is less than midpoint that is 4 so it represents that hierarchical structure is not comparatively important factor with other variables. Empowerment contains mean 3.06 and significance of .000 it shows the importance of empowerment toward project risk response success but it is not as much important as other factors are important. Behaviour has mean 3.37 with significance level .000 so it indicates that this factor is important as well however, behaviour is not relatively important to other variables. As we described it before that this question is used as counter check for question 26; both of the questions represent same kind of responses. This shows that the 2nd alternative hypotheses (H1b, H2b, H3b, H4b, H5b, H6b and H7b) are true for all of variables. Hence, we accept H1b, H2b, H3b, H4b, H5b, H6b and H7b.

Although we have accepted all the aforementioned 2nd alternative hypotheses, we have classified the variables according to their importance. Some variables are more important while others are less important. As also discussed above about how important the factors are according to their mean values (whether they are more than or less than the midpoint mean value of 4), we have denoted the terms of primary factors and secondary factors accordingly. Primary factors refer to those variables that have a mean value of more than the midpoint mean value of 4 whereas secondary factors refer to the variables having a mean value of less than 4. Therefore, effective communication, active leadership, negotiation and coordination and team competency and skills are important primary factors to be considered while responding to risk successfully. On the other hand, hierarchical structure, empowerment and behaviour are important as well but considered as secondary factors for project risk response success.

5.7.2 Relative importance index (RII)
The relative importance index (RII) for each individual factor can be finding out by using the following formula (Chan & Kumaraswamy, 1997, p. 57; Kumaraswamy & Chan, 1998, p. 19; Iyer & Jha, 2005, p. 286; Olawale & Sun, 2010, p. 514). By utilizing this formula we validate the SPSS test applied for relative importance.

\[
\text{Relative importance index (RII)} = \frac{\sum w}{AxN}
\]

w is weight given to each factor by the respondents, which ranges from 1 to 7 where '1' is 'least important' and '7' is 'most important', A = highest ranking available (i.e. 7 in this case), and N = total number of respondents that have answered the question (i.e. 220 project managers). AxN= 7x220= 1540. The value of w for each factor is mentioned in Table 30 below.
Table 30: Helicopter view of relative importance of independent variables

<table>
<thead>
<tr>
<th>Factors</th>
<th>w</th>
<th>RII</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team competency and skills</td>
<td>1108</td>
<td>0.719</td>
<td>1</td>
</tr>
<tr>
<td>Effective communication</td>
<td>1020</td>
<td>0.662</td>
<td>2</td>
</tr>
<tr>
<td>Active leadership</td>
<td>964</td>
<td>0.625</td>
<td>3</td>
</tr>
<tr>
<td>Negotiation and coordination</td>
<td>893</td>
<td>0.579</td>
<td>4</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>765</td>
<td>0.496</td>
<td>5</td>
</tr>
<tr>
<td>Behaviour</td>
<td>741</td>
<td>0.481</td>
<td>6</td>
</tr>
<tr>
<td>Empowerment</td>
<td>674</td>
<td>0.437</td>
<td>7</td>
</tr>
</tbody>
</table>

5.7.3 Helicopter view- Ranking of independent variables according to relative importance

Table 31: Ranking of relative importance of independent variables

<table>
<thead>
<tr>
<th>Determinates of project risk response success</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team competency and skills</td>
<td>1</td>
</tr>
<tr>
<td>Effective communication</td>
<td>2</td>
</tr>
<tr>
<td>Active leadership</td>
<td>3</td>
</tr>
<tr>
<td>Negotiation and coordination</td>
<td>4</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>5</td>
</tr>
<tr>
<td>Behaviour</td>
<td>6</td>
</tr>
<tr>
<td>Empowerment</td>
<td>7</td>
</tr>
</tbody>
</table>

This table above (Table 31) shows the overview of relative importance and integrates it in order to make it understandable for reader. The above table depicts the ranking of each variable. The aforementioned table represents the relative importance of each variable. Therefore, team competency and skill is comparatively the most important determinant of project risk response success, and empowerment is the least important factor.

5.8 Result discussion

The aim of this section is to discuss the findings of our data analysis. This would be helpful to answer our research questions. For each independent variable we used to find out that it has effect on our dependent variable which is project risk response success and if it impact on dependent variable then what is their relative importance to other independent variables and with each other.

5.8.1 Independent variable- Team competency and skills

Team competency and skill is one of the most important determinants for project risk response success. It affects project risk response success. The relationship between team competency and skills and project risk response success is strong and positive in direction. We have one intervening variable training and education that affect the relationship between team competency and skills and project risk response success. Team competency and skills is number one in
relative importance with comparison to other six factors that could affect dependent variable i.e. project risk response success.

**5.8.2 Independent variable- Effective communication**
We find out that effective communication is one of the variables that have impact on project risk response success. The association between effective communication and project risk response success is strong and direction of relationship is positive which means that change in effective communication leads to change of same direction in project risk response success. Effective communication is second most important variable for project risk response success. The association of effective communication and project risk response is effected by two intervening variables trust and confidence and openness to opinion.

**5.8.3 Independent variable- Active leadership**
The result shows that active leadership is also important factor to determine project risk response success. Active leadership and project risk response success is strong and positive in direction of relationship. Which embodies if active leadership is increased project risk response success will be increased as well. Active leadership is third most important variable out of seven variables for project risk response success.

**5.8.4 Independent variable- Negotiation and skills**
The above data analysis represents that negotiation and skills should be considered as determinant for project risk response success. Negotiation and coordination and project risk response success is strongly correlated with each other and the direction of relationship is positive. It show that decrease in negotiation and coordination leads to decrease the capability to respond the risk. Negotiation and coordination is number fourth in relative importance.

**5.8.5 Independent variable- Hierarchical structure**
The data analysis shows that hierarchical structure affects the project risk response success. The relationship between hierarchical structure and project risk response success is moderate and direction of linkage is positive. It shows that change in hierarchical structure will leads to change in project risk response at the same direction. The relationship is moderate as well, not very strong which impact the importance of hierarchical structure. The relative importance of hierarchical structure is not very high; it is ranked number fifth in seven determinants for project risk response success.

**5.8.6 Independent variable- Behaviour**
Behaviour and project risk response have significant relationship with each other. This relationship is positive in direction but weak. Due to weak relationship it does not have too much impact on project risk response success. Behaviour is ranked at sixth in relative importance for determinants of project risk response success.

**5.8.7 Independent variable- Empowerment**
Empowerment has connection with project risk response success. The connection is moderate and positive in direction. So it indicates that increase in empowerment will increase project risk response success and decrease in empowerment will decrease project risk response success. Due
to moderate relationship between empowerment and project risk response success its importance is affected. Empowerment is ranked as last, number seventh in relative importance it demonstrates that it is the least important element to be considered for project risk response success.

5.8.8 Intervening variable- Trust and confidence
Trust and confidence is the variable that affects association of effective communication and project risk response success. Trust and confidence is strongly related to effective communication and has weak relationship with project risk response success. Trust and confidence has positive direction of relationship with effective communication and project risk response success. It represents that increase/decrease in trust and confidence will lead to increase/decrease in effective communication and project risk response success.

5.8.9 Intervening variable- Openness to opinion
Openness to opinion is catalyst that influenced on connection between effective communication and project risk response success. Openness to opinion is strongly related to effective communication and has weak relationship with project risk response success. Openness to opinion consists of positive direction of relationship with effective communication and project risk response success. It means that change in openness to opinion brings change in same direction in effective communication and project risk response success.

5.8.10 Intervening variable- Training and education
Training and education is the variable that affects relationship of team competency and skills and project risk response success. Training and education is strongly related with team competency and skills and has moderate relationship with project risk response success. Direction of relationship is positive which means that increase in training and education will cause to increase in team competency and skills and project risk response while decrease in training and education will cause to decrease in team competency and skills and project risk response success.
5.9 Revised conceptual model
With the findings of our research, we have revised our conceptual model as illustrated below in Figure 18.

![Figure18: Revised conceptual model](image)

The revised model contains all the independent and intervening variables that we have also mentioned in our proposed conceptual model. This indicates that all the independent factors for which we have conducted the testing of hypotheses impact project risk response success. Similarly, all the intervening variables have a mediating effect on the corresponding independent factors, which in turn determine project risk response success. Training and education is an...
intervening factor for team competency and skills, while both trust and confidence and openness to opinion mediate effective communication. However, our revised conceptual model is different from our proposed conceptual model. We split the independent variables in two sections i.e. primary factors and secondary factors. Primary factors are those factors which are most important for risk response success whereas secondary factors are less important than primary ones. There are seven independent variables from which four are primary and three are secondary factors. Independent variables are mentioned according to their ranking. The relationship of each independent variable is positive toward dependent variable e.g. team competency and skills increase will lead to project risk response success or vice versa. The model contains three intervening variables the results shows that intervening variables are strongly associated with independent variable then the dependent variable.
6. Conclusion and recommendations

This is the final chapter of our study and it presents our scientific conclusion. The theoretical, practical and methodological implications are depicted in this chapter. Moreover, further research suggestions are given at the end of the chapter.

6.1 Conclusion

The purpose of this research study is bi-dimensional; firstly to explore and validate the factors pivotal for project risk response success in the construction industry, and secondly, to measure the relative importance of these variables against one other. The data was presented and analyzed to answer two research questions:

1. What are the determinants of project risk response success in the construction industry of Sweden?
2. How important are the determinants of project risk response in the construction industry of Sweden?

The major findings and results can be concluded as:

First, there are seven factors that can affect project risk response success, i.e. effective communication, active leadership, negotiation and coordination, team competency and skills, hierarchical structure, empowerment and behaviour. The results of the study show that all of the aforementioned variables have an association with project risk response success. The relationship direction is positive meaning that increase in these variables will lead to increase in project risk response success. The strength of association is different from variable to variable. Effective communication, active leadership, negotiation and coordination and team competency and skills are strongly associated with project risk response success. Hierarchical structure and empowerment have moderate relationship with project risk response success. Behaviour is the only variable that has weak association with project risk response success. These results serve as justification of first aim of our study.

Second, there are three variables that are affecting relationship of dependent variable and independent variable. Trust and confidence and openness to opinion affect relationship of project risk response and effective communication. On the other hand, training and education affect the association between project risk response success and team competency and skills. Results represent that trust and confidence and openness to opinion affect the relationship of project risk response success and effective communication in positive direction. This indicates that a change in one variable will change the other variable in the same direction. The associations of trust and confidence and openness to opinion are extremely strong with effective communication and weak with project risk response success. Results of the study indicate that training and education affect the relationship of team competency and skills and project risk response success in positive direction. Training and education is strongly related to team competency and skills and establish moderate relationship with project risk response success.

Third, we ranked variables according to their relative importance and that enlightens to second objective of our study. Team competency and skill is the most important variable and contains the first position in relative importance. Effective communication holds second place, active
leadership is the third one and negotiation and coordination is fourth in relative importance. While hierarchical structure contains fifth, behaviour holds sixth and empowerment is the last seventh one in the relative importance.

6.2 Theoretical implications
The study contributes to both project management and risk management disciplines. Prior research has focused on risk management planning phase. However, Geraldi et al. (2009) are the first ones to discover critical success factors for unexpected events in defence industry. The variables discovered by Geraldi et al. (2009) in their research are confirmed and tested in our study by applying it to construction industry of Sweden. This study has revealed seven critical success factors for successful risk response in construction industry of Sweden. The hypotheses were confirmed by the empirical findings. Therefore, the seven critical success factors can be used to base on theory for project risk response in construction industry of Sweden.

This study contains three theoretical implications. First, this topic is helpful to understand determinants of project risk response success. Second, we find out intervening variables that have impact on relationship of independent factors. Third is relative importance of the determinants particular in construction industry. Moreover, main contribution is to highlight the importance of project risk response for researchers and students as this area is unexplored yet. Future studies related to project risk response success construction industry can use this study as a base for further research. This will be helpful for researchers to focus their research interest on related topic.

6.3 Practical implications
As researchers we believe that our research study play vital role in practical implications. Numbers of practical implications are obvious as topic we studied is not fully explored. First, this research study is focusing on construction industry, which would be helpful to consider seven determinants of study to response risk successfully. Second, the project practitioners and stakeholders know the importance of project success if they respond risk successful it can contribute to project success which is the primary objective of stakeholders. Third, this study shed light that top management and HR or personnel department to play their role in order to assure that determinants of risk response success are fully taken into consideration. Furthermore, the role of project manager is very important as he/she is the one who is leading the whole team; our study provides guidelines for project managers to successful risk response. These determinants can be building blocks for other business and industries to focus on project risk response success. It is critical that project practitioners and stakeholders to be mindful for risks in order to respond them successfully.

Some practices that could be implemented in construction companies is that training programmes can be conducted in the companies to ensure that staff are educated about competencies required for the job. Since training and education has a mediating effect on team competency and skills, this would increase the level of team competency and skill. This eventually leads to the ability to respond to risks successfully. Similarly, project managers can ensure that the work environment is conducive to the sharing of opinions and a work culture or having activities that emphasize trust and confidence in project practitioners are available. This would lead to an increase in effective communication since this factor is mediated by both trust and confidence and openness.
to opinion. This eventually results in being able to respond to risks successfully. Thus, the conceptual model guides project managers regarding the factors important to response project risk successfully.

6.4 Methodological implications
We have chosen to undertake a quantitative research. As shown previously in Table 2, we have illustrated the prior work of researchers who have conducted similar studies albeit via different research methods. Case studies and interviews were used in their work, which are predominantly qualitative in nature. As our research is based on quantitative data, we can implicate our findings to a wider population from the sample that we have taken. This means that we are able to generalize our results to the construction industry in Sweden. This also validates our risk response framework consisting of factors that are deemed important, which in turn is useful to guide project practitioners, researchers and students in this area.

6.5 Future research
This study has covered two important areas that are project management and risk management with respect to project risk response success. Most of the researchers focused on other phases of risk management and neglected project risk response success. It is pivotal for contemporary researchers to focus on project risk response success individually. Regarding project risk response success more studies should focus on comparative research by comparing different countries response for determinates of project risk response success. Impact of different culture on project risk response could be one topic to study. It could be possible that project risk response determinates’ relative importance might be changed when it will be applied to different culture and country. We suggest that the research study particular questions and model should be tested in other settings, e.g. other organizations with other types of projects. Results show that team competency and skills are most critical for project risk response success but it might not be that much important when study is conducted in different country and in different culture. There could be other variables as well that we are unable to identify in our proposed conceptual model but they can affect project risk response success. This will open a new spectrum for future research to extend and enhance the proposed conceptual model.

Since our study is based on quantitative research, rich data derived from qualitative studies may be lacking. For the purpose of this paper however, quantitative method fulfils our research objectives. For future research into the construction industry regarding project risk response success factors, a qualitative study could be undertaken to get more elaborate and diverse perceptions of project managers.

In our study we are just focusing on construction industry but project risk response is critical for other sectors such as IT, telecom, banking, health and education, so other sectors are open for investigation. How different categories of risks are successfully responded is also candidate for future research. The result of our study showed that team competency and skills are foremost for project risk response success. Our recommendation for future researchers is to investigate the essential ingredients for team competency and skills, and how project practitioners can get benefit out of it. Moreover, interviews and case study method can be used for data collection. In our study we are just focusing on construction industry in Sweden due to limited resources but future researchers can focus on construction industry in different countries. Sample size can be
increased and the upcoming researchers should focus on other sectors as well. The factors we determined in our research study can be tested in other business and industrial sectors. This is unexplored and an important phenomenon to study that provides an opportunity to academic researchers and students to consider this area with different perspectives and made their contributions.
References


http://proxy.ub.umu.se:2077/ehost/pdfviewer/pdfviewer?vid=3&hid=12&sid=0e72038a-ea44-41d3-85a5-b602536bfe8b%40sessionmgr13
[Retrieved 02-11-2011]


QUESTIONNAIRE

Hej! We are students of the Master of Science in Management program in Umeå University, Sweden. As part of our thesis, we are researching on the factors that determine successful project risk response within the Swedish construction industry.

To answer the following questions, kindly reflect on your projects (current or past) whereby there was an unexpected situation or uncertainty that arose. This event should have had some risk involved, either in terms of project scope, time or/budget. Think of how this risk was responded to successfully and reflect on the factors which made this risk response a success.

Risk definition: Risk is an uncertain event that can affect project objectives like cost, time, scope, etc.

Your responses in this survey are valuable to us and will greatly contribute to our study. We thank you for your time and effort.

Kindly fill in the information below and check the boxes that are most applicable to you.

Note: This information will be kept confidential and will not be used for any other purpose other than this study.

Risk response

1. Does your organization have a risk response doctrine/manual?
   - Yes   - No   - Do not know

   1 (a). If Yes: Is it clear and easy to understand?
   - Yes   - No   - Somewhat

2. How important is successful risk response to your projects?
   - Very important   - Important   - Somewhat important   - Not important

3. Are you aware of the factors that could have contributed to a successful risk response in your projects?
   - Yes   - No   - Somewhat

   Effective communication

4. For successful project risk response, the availability of relevant information is:

   

100
5. To what extent does listening and acknowledging your team’s concerns contribute to project risk response success?

☐ Very important  ☐ Important  ☐ Somewhat important  ☐ Not important

6. For project risk response to be successful, how important is a two-way communication (i.e. communication flows freely between you and your team members)?

☐ Very important  ☐ Important  ☐ Somewhat important  ☐ Not important

7. The impact of effective communication on risk response success can be reduced if the project team does not respect one another’s opinion:

☐ Strongly agree  ☐ Agree  ☐ Somewhat agree  ☐ Disagree  ☐ Strongly disagree

8. Trust and confidence in the project team can increase the impact of effective communication on risk response success:

☐ Strongly agree  ☐ Agree  ☐ Somewhat agree  ☐ Disagree  ☐ Strongly disagree

**Active leadership**

9. Is there a need to have different project leaders: one for (1) risk response to unexpected events or uncertainty; and the other for (2) ordinary, day-to-day project work?

☐ Strongly agree  ☐ Agree  ☐ Somewhat agree  ☐ Disagree  ☐ Strongly disagree

10. How important is it for project leaders to respond successfully to unexpected events or uncertainty?

☐ Very important  ☐ Important  ☐ Somewhat important  ☐ Not important

11. For successful risk response, to what extent do you trust the opinions of your project team members in resolving the situation?

☐ Large extent  ☐ Somewhat large extent  ☐ Small extent  ☐ Not at all

12. Competent leaders who respond successfully to project risk are those who most likely (choose one only):

☐ Take quick action in making decisions  ☐ Create calmness in the team  ☐ Enable coordination among team members  ☐ Provide the right resources in a timely manner
Negotiation and coordination

13. How important is the ability to negotiate solutions with stakeholders (clients, suppliers, etc.) in determining success in project risk response?

☐ Very important  ☐ Important  ☐ Somewhat important  ☐ Not important

14. To what extent does coordination in the project team contribute to successful risk response?

☐ Large extent  ☐ Somewhat large extent  ☐ Small extent  ☐ Not at all

15. How important to risk response success is engagement with stakeholders (eg. provide information updates, give assurances, etc.) when faced with unexpected events or uncertainty?

☐ Very important  ☐ Important  ☐ Somewhat important  ☐ Not important

Team competency and skills

16. To what extent does a competent project team determine success in risk response?

☐ Large extent  ☐ Somewhat large extent  ☐ Small extent  ☐ Not at all

17. Are there training sessions conducted to prepare the project team for risk response?

☐ Yes  ☐ No  ☐ Do not know

17 (a) If Yes: How frequently are the training sessions conducted?

☐ Monthly  ☐ Quarterly  ☐ Half-yearly  ☐ Yearly  ☐ Other (please specify):_______

18. Lack of cooperation and support given to one another in the project team can reduce risk response success:

☐ Strongly agree  ☐ Agree  ☐ Somewhat agree  ☐ Disagree  ☐ Strongly disagree

Hierarchical structure

19. To what extent does a high degree of flexibility in making decisions within the organization contribute to project risk response success?

☐ Large extent  ☐ Somewhat large extent  ☐ Small extent  ☐ Not at all
20. Structures and processes within the organization that are not easy to understand can reduce project risk response success:

☐ Strongly agree  ☐ Agree  ☐ Somewhat agree  ☐ Disagree  ☐ Strongly disagree

21. For success in project risk response, how important is the ability of organizations to respond to changes quickly?

☐ Very important  ☐ Important  ☐ Somewhat important  ☐ Not important

**Empowerment**

22. Do you have sufficient freedom in taking actions towards project risk?

☐ Yes  ☐ No  ☐ Somewhat

23. A high degree of freedom given to the project team members (in deciding what needs to be done, how to do it, etc.) contributes to successful risk response:

☐ Strongly agree  ☐ Agree  ☐ Somewhat agree  ☐ Disagree  ☐ Strongly disagree

**Behaviour**

24. To what extent does the ability to control emotions in stressful situations contribute to successful project risk response?

☐ Large extent  ☐ Somewhat large extent  ☐ Small extent  ☐ Not at all

25. When people are under pressure due to uncertainty or unexpected situations, this could reduce the success of project risk response:

☐ Strongly agree  ☐ Agree  ☐ Somewhat agree  ☐ Disagree  ☐ Strongly disagree

**Success factors of project risk response**

26. How would you measure these statements? (1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree)

(a) Effective communication impacts risk response success  
1  2  3  4  5

(b) Active leadership impacts risk response success  
1  2  3  4  5

(c) Negotiation and coordination impacts risk response success  
1  2  3  4  5

(d) Team competency and skills impact risk response success  
1  2  3  4  5
How would you rank the following factors, according to importance, of successful project risk response? (1= least important and 7= most important).
You cannot give same numbers to two options i.e. there cannot be 1 for Effective communication and another 1 for Active leadership.

- Effective communication
- Active leadership
- Negotiation and coordination
- Team competency and skills
- Hierarchical structure
- Empowerment
- Behaviour

Comments

Please provide any other comments that you may have regarding project risk response:

Classification Questions

29. Age: ______

30. Gender: □ Male     □ Female

31. Number of years of experience in project management: ______

THANK YOU!