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## Risk Management Processes & Techniques For The Successful Delivery Of Web Based Software Projects

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### ABSTRACT

*This study investigates risk management processes and effective techniques for web based software projects implemented for different IT organizations. There is limited literature on what risk management processes & techniques software practitioners use. This study tend to focus on application development for new requirement, software enhancement and application support projects. It investigates the criteria to identify, analyze, plan and control the risk. It also suggests important risk and risk categories and techniques perceived to address these risks and how effective those techniques are considered to be. One of the primary risk i.e customer supplier relationships is found to be of primary importance, yet this risk is not suggested by the project management literature.*

*In order to have successful delivery of the software projects, there is a need to have in-depth exploration of risk management. As a result of this study, it is suggested that project team may find it useful to consider the risk management processes and effective techniques discussed in this article and how applicable these are to their individual organization. It is suggested that research into standard project risk management approaches may need to be combined with business risk management approaches to gain a full understanding of the risks faced and addressed by project team.*

**Keywords : Risk Management Issues, Risk Management Processes, Risks Encountered**

### Introduction

This study investigates risk management processes & techniques for resolving uncertain events or conditions that, should it or they occur, has an effect on at least one of the project objective (Cost, Time, Scope, Quality).



In our contemporary world, software plays a part in almost every aspect of our lives. This includes government administration, telecommunications and virtually every sector of the economy. Government and business have become so reliant on software that it is

hard to see how they would function without it. Software is crucial to the productivity of wealthy countries. The public have an increasing, direct exposure to software, particularly commoditized applications. In short, software has become pervasive. Study team finds following hypothesis as an important criterion for the root cause analysis of the failures.

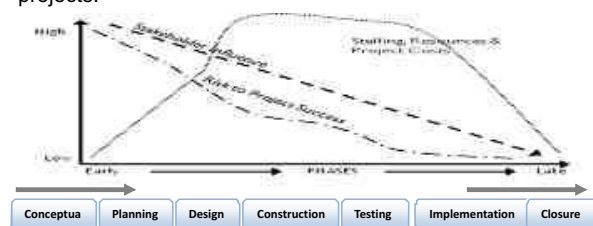
- H-1: Uncertain events or circumstances having negative impact, causes failure of the web based software projects.
- H-2: Human Interaction, Abstraction, Complexity, Volatility factors are responsible for the failure of software projects.
- H-3: Formulation of risk management strategy framework can prevent failure of IT projects.
- H-4: Adoption of effective practice model can prevent failure

of software implementation projects.

IT Software projects are particularly difficult to manage because they have some inherently complex characteristics which is not always common or evident in other types of engineering or real estate projects (to which IT software projects are commonly compared). These includes the degree of human interaction (Baines, 1998), the impact of abstraction, high levels of complexity (Jurison, 1999). All of these characteristics make the task of managing project risk particularly difficult in software development projects. The difficulty arises because project risk management involves prediction, experience and anticipation, yet the problems just described, hinder one's ability to view the future with certainty.

Moving forward on a project without a proactive focus on project risk management

increases the impact that a realized risk can have on software project and can potentially lead to failure of IT software projects.





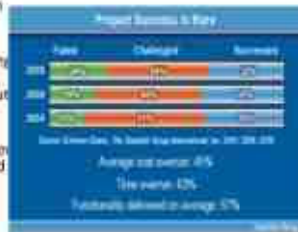
Following risks seems to be the potential areas where future research might be useful. They are: customer relationship issues, High attrition rate/retaining best talent, introduction of new technology and unrealistic schedules and budgets. Project Risks related to customer relationship issues were of particular significance and have tended to be over looked in IT project management literature.

**Problem Statement & Rational for the study**

The importance of risk management for software implementation projects can hardly be overstated. Such projects have been widely recognized as being highly risky for some years. Standish CHAOS Report 2009

**Is Project Success Really that Rare?**

- Specifically, 32 percent of IT projects were considered successful, having been completed on time, on budget and with the required features and functions.
- Nearly one-in-four (24 percent) IT projects were considered failures, having been cancelled before they were completed, or having been delivered but never used.
- The rest (44 percent) were considered challenged. They were finished late, over budget, or with fewer than the required features and functions.



To further compound matters more companies are entering into the software development arena, meaning that greater proportions of economies are getting exposed to the high levels of risk associated with software development. Due to the increasingly high level of unknown influences and risks in these endeavors, IT project may not deliver what was originally agreed to. Technically such projects may be termed a failure. It can be argued that this traditional view of project success is not suitable for an endeavor such as software development. It therefore seems that traditional measures of success may be misleading when considering software projects. Anything that threatens project success (in this broad sense) may be termed a project risk. Thus the supplier and customer relationship becomes very important when considering risk management for software projects. As mentioned above one of the things that make software development projects difficult is human endeavor, where human interaction is crucial. Even before new software is deployed on production environment, it begins to change the way people work. There is a need of strong motivation to explore the area of customer-supplier relationships as it pertains to project risk management.

**Materials and Methods:**

This study is concerned with realities and perceptions regarding risk management processes & techniques used for web based software project. As previously discussed in the introduction to this study, software development is a human endeavor that is at least partially creative. It also includes a high degree of abstract representation. Furthermore, this part of study is focused on perceptions and live project implementation. A purely positivist paradigm cannot account for such personal and metaphysical experiences. Thus a certain degree of interpretation is required for this part of the study.

By being grounded in a positivist paradigm, a measure of scientific rigour can be achieved. At the same time by leaning towards an interpretivist paradigm this work considers those social and metaphysical aspects that are so important to software development practices. Beachboard (2004) describes the traditional existence of two contentious issues when considering IT practices in academia:

1. There is a desire for scientific-style rigor in research, yet there is a pressing need to address issues relevant to practitioners.

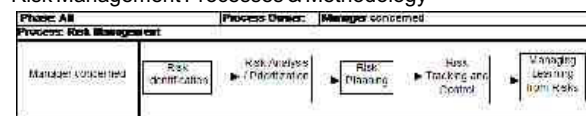
2. There is debate concerning the suitability of positivist versus non-positivist approaches to what is a branch of social science research.

Beachboard further discusses these issues and consequently promotes a multi- paradigmatic approach to research on risk management practices. This study also leans away from a singularly positivist paradigm towards an interpretive paradigm. It should be considered that any particular view of the world sits on a sliding scale of recognized ways to view reality. A certain degree of the interpretive paradigm has been included for the purposes of this study to gain the rich insights potentially available from practitioners.

The appropriateness of a mixed-method approach is further reinforced if the uniqueness of software projects is considered. To elaborate: the objective of this study is to consider current practices, a practice being a process that is generally followed. A practice might be considered a code of conduct. That is, a series of steps or actions that is expected to be followed in most situations. Studies have shown that in software teams, what is actually practiced is not the same as what was defined as the practices to be followed (Hesse, 1996; Verner & Cerpa, 2005). Furthermore, by definition, no two bespoke/customization projects are ever the same the development of such software inherently contains some degree of creating something new. In other words these projects each have a certain degree of uniqueness, novelty and are not repeated. In software development every instance of a project practice could potentially be different in order to cater for the differences in each project. A purely positivist paradigm would struggle to provide meaningful insights into something so vaguely defined and that continually varies.

An appropriate approach for this study was to interview experienced project managers involved in execution & implementation of web based projects in different IT (Information Technology) organizations. Structured interviews enable the collection of targeted data while also allowing depth to be explored in areas of interest as they arise. A range of experienced project manager from several IT organizations were interviewed to form a multi-site field study. This was achieved by having prepared questions and by filling out a worksheet as the interview progressed. This provided a sense of the practices employed in general whilst the use of interviews provides rich insights into processes and effective techniques utilized by different IT organizations.

**Risk Management Processes & Methodology**



**Risk Identification**

- Identify the risks and the risk category, source under which the risks can be grouped. There are many methods for identifying risks. Typical identification methods include the following:
  - o Examine each element of the project work breakdown structure to uncover risks. Conduct a risk assessment using risk category, source.
  - o Interview subject matter experts.
  - o Review risks of similar projects from the organizational risk database.
  - o Review the project criticality assessment rating and report to identify potential risk from project complexity, business, technology, customer, team perspective
  - o Review the commitment review form to identify potential risks from project complexity, business, technology, customer, team perspective
  - o Examine design specifications and agreement requirements.
  - o Risk to be identified from information security perspective as well.
  - o Author has given very good practical example being used for IT projects

- Create a list of identified risks using the Risk Register , including the context, conditions, and consequences of risk occurrence. This list should be comprehensive, covering all areas of the project/engagement/function (Please refer Risk Categorization section mentioned below).

**Risk Analysis/ Prioritization**

o As few projects or initiatives operate in a complex techno- commercial environment with different stakeholders and differing priorities, they are challenged by many risks. The Manager concerned will need to prioritize them in a way that will allow him to focus attention on the vital few rather than the insignificant many. In order to do so in a systematic manner, he must quantify (to the extent possible) the exposure which is defined as the product of the probability of occurrence and the impact if the undesired event does, in fact, take place . :

o Estimate probability of occurrence of the undesired event. Where it is not possible to have an objective and quantitative scale for probability, the following guideline may be used.

o Probability Range	o Probability Ratings
1% through 33%	Low (1)
34% through 67%	Medium (3)
68% through 99%	High (5)

- Estimate the level of impact for each risk. This estimate should, preferably be in monetary terms and should reflect the loss to the project or the organization in case the undesired event does take place. This estimate is based on the experience and understanding of the project manager.
- Determine risk exposure (probability \* impact): Again, it is preferred that both the probability and the impact are quantified. Where it is not possible to quantify either of these, the following table may be used for guidance.

Probability \ Impact	Low Impact (1)	Medium Impact (3)	High Impact (5)
Low Probability (1)	1	3	5
Medium Probability (3)	3	9	15
High Probability (5)	5	15	25

- Rank the risk based on risk exposure (e.g., risk with highest value of risk exposure will be ranked first). It is not practicable to try managing all the risks; team may identify top few risks (for example, projects may want to focus on top 3 or 5 Risks) based on risk rank and manage those risks.
- If risk exposure is in between 5 to 25 as per above probability vs. impact matrix then those risks should be tracked and attended .
- Ensure risk actions are executed when the risk exposure rating reaches the threshold of medium risk exposure (=5 or 9).
- Ensure reporting / escalation of the risk and the status to management when the risk exposure rating reaches the threshold of high exposure (=15 or 25).
- Update the risk register with Identified risks from the above risk ranking table.

**Risk Planning**

The Manager concerned will:

- Identify an approach to manage the identified risk from risk ranking table . For each identified risk, the approach could be one or more of the following:
  - To Eliminate risks
    - Avoid: Eliminate the causes by changing the approach/ method while still meeting the user's needs so that the risk is avoided
    - Transfer: Transfer the risk ownership to another project, team, organization or individual to minimize the impact of the risk.
  - To Mitigate risks

- Mitigate: Determine the mitigation plan to reduce the probability of occurrence of the risk. Risk mitigation plans are developed and implemented as needed to proactively reduce risks before they become problems. Develop alternative courses of action, workarounds, and fallback positions, with a recommended course of action for each critical risk.

c. To develop contingency plans

Develop a Contingency plans to reduce the impact if the risk does occur.

- It is mandated to have a contingency plan for risk having High probability with Medium impact or High Impact (risk exposure = 15 or 25)
- Based on the approach, Identify plan to eliminate, transfer or mitigate the risk and role/person responsible for executing them.
- Define the events/ triggers or the periodicity at which the risk exposure will be reviewed and recalculated if necessary.
- Define the threshold beyond which the identified plan for risk will be executed.
- Define the various possible actions that would be initiated. The action could be mitigation plans or escalation to senior management/ customer/ other stakeholders, etc.
- Note : For a given Risk, the project could be having 1 or more action plan (for example, for a risk, project could have transfer and contingency plan or mitigation and contingency plan). Risk register should be updated with one row each for different action plan (one row or mitigation plan and one row for contingency plan )

**Risk Tracking and Control**

The Manager concerned will periodically monitor the following and update the risk register:

- Risk monitoring and tracking actions are implemented as planned
- Risk monitoring and tracking actions are as effective as expected, or if new actions need to be developed
- Project assumptions are still valid.
- A risk trigger (an indication that a risk threshold is crossed or is about to be crossed) is activated.
- New Risks that were not previously identified have been identified.
- Probability, impact, exposure, status of the risks remain unchanged.

Project manager to re-assess the Risk probability, Risk impact and Risk exposure after applying the identified Mitigation / Contingency plan. This will help the project manager, if the mitigation / contingency plan applied are effective enough to prevent or minimise the risk exposure. If Project manager observes that even after applying the identified mitigation / contingency plan, the risk exposure is not reduced, then different risk handling approach or action plan to be identified and action plan implemented

Project manager to maintain the initially identified Risk probability, Risk impact current Risk probability and Risk impact for reference. Risk tracking will also include Risk reporting, which ensures that all the relevant stakeholders are aware of the status of project/program risks and the plans to manage them.

**Learning from Risks**

The Manager concerned will capture the lessons learnt and the knowledge in performing the risk management activities in reusable form for reuse within the team and by the organization. The Manager concerned will update the project/program closure report with:

- New risks. If the project/program encounters an issue that had not been identified earlier as a risk, it will review whether any signs (leading indicators) could have helped to predict the risk.
- Successful mitigation strategies. Capture experiences of strategies that have been used successfully (or even unsuccessfully) to mitigate risks under various risk category and risk sources.

**Risk Categorization**

Risk categorization is designed to provide an understanding of project risk boundaries. It helps project managers to identify, understand and monitor project's potential risk. These categories have two main purposes: 1) to help identify the project's risks; and 2) to pull together risk information in a concise profile that helps users understand and monitor identified exposures. Successful risk categorization can be compared to an effective medical evaluation. If the doctor asks: "How do you feel?" the patient might say, "Fine." But the examination is much more revealing if the doctor asks: "How do your knees feel? How about your lungs? Any back pain?" With these questions, the patient will begin to think specifically about his or her body parts.

Following risk categorization is based on highly experienced project manager's perspectives, who have implemented risk management processes and techniques for their organization.

Sl. No	Risk Category	Risk Statement
1	People Skills	Lack of application / domain Knowledge
		Lack of technical expertise
2	Technology – Operational Environment	Server Access failure
3	People – Personnel	Resource Churn
4	Process – Requirements	Inadequate Requirements Frequent Change in Requirements
5	Environmental – Technology	Unplanned and uninformed environment outages
		Inadequate seats for employees
6	Technology – Development and test Environment	Poor / Inadequate documentation on various phases of the applications.
		Development/Testing environment Unavailability
7	Environmental – Business	Dependency on vendors
		Delay in getting development Environment
8	Process – Budget, Cost Schedule	Purchase Order not received
		Lack of visibility of future work stack
9	Process – Decision making	When design/development work is started on a particular release, if customer decides to have another release before this release, then release numbering could be difficult.
10	Process – Testing	New, unforeseen work areas interfering with the planned work
11	People – Stakeholders	Impact on delivery due to non-cooperation from stakeholders
12	Technology – Deployment	Delay in delivery /retrofits due to multiple interfaces.
13	People – Customers	Delay in Review comments / Sign-offs Delay in getting technical information from customer.
14	People – Morale	Less motivation among team
15	People – Politics	Political disturbances / sudden disruption of services locally
16	Technology – Security	Active Cards non availability

Risk Register : Risk Management Plan:

A Risk register is a tool commonly used in project planning and organizational risk assessments. It is often referred to as a Risk Log.

This tool is widely used within Risk management for identifying, analyzing and managing risks. It contains the information on the identified and collected project risks that the project team identifies when estimating and adjusting the activity durations for risks.

The project team considers the extent, to which the effects of risks are included in the baseline duration estimate for each schedule activity, particularly the risks with high impact.

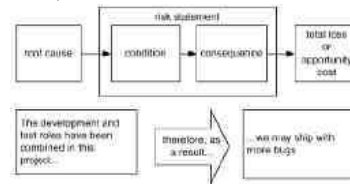
**Risk Exposure thresholds for execution of risk mitigation/contingency plan :**

Determine the risk exposure thresholds that define when a risk becomes unacceptable and triggers the execution of a risk mitigation plan or a contingency plan.

Risk Id : Unique identifier no. for the risk.

Risk Category : Risk Category and Source to be defined clearly (Kindly refer 2nd column of Risk Template given above).

Risk Statement: Clearly articulate the risk with the condition and the consequence.



Owner: Person responsible for monitoring, tracking and closing the risk.

Risk Description: A textual description of the risk.

Potential Business Impact: A textual description of the effect on the project should the risk occur.

Probability: A numerical rating representing chance that a risk will occur.

5 - Certain, Already Observed

4 - More likely to occur than not

3 - 50/50 chance of occurring

2 - Less likely to occur

1 - Very unlikely to occur

Impact : A numerical rating representing the impact should the risk occur.

0 - No impact

1 - Insignificant changes, re-planning may be required

2 - Small delay, small increased cost, but absorbable

3 - Delay, increased cost in excess of tolerance

4 - Substantial delay, key deliverable not met, incur costs

5 - Inability to deliver, business case/objective not viable

Risk Exposure (A\*B): The product of the probability and the impact ratings.

Rank : Rank of the risk based on risk exposure rating.

E.g., The risk with the highest value for risk exposure will have the rank 1(One)

Risk Handling Approach: Mention how the risk will be handled. This will include one or more of the following: Avoid, Transfer, Mitigate, Accept & Contingency (Please refer Risk planning section mentioned above)

Actions : Mention the actions to be taken based on risk.

Risk Status: Active: possibility of the risk exists & Inactive: The risk no longer exists.

Residual Probability : Risk Probability after implementing the identified risk action plan.

Residual Impact : Risk Impact after implementing the identified risk action plan.

Residual Risk Exposure (Numerical Value : Refer above for the numerical value of probability and impact) = Residual Probability \* Residual Impact

**Results and Discussion:**

This section is a summary of the themes that have emerged from the analysis and a consideration of those themes in relation to the contemporary literature. These themes fall under the following headings:

- Identification of risks
- Size and complexity of projects
- Complex management issues
- Link between project success and business success
- Techniques work when used
- Measurement of effectiveness
- Standard Project Management practice
- Use of multiple techniques
- Flexibility
- Efficacy: optimal practice versus effort

**Important risks Encountered**

There is actually broad agreement in the literature on what risks are important for successful delivery of software projects. Project Management literature is based on what experienced project managers had found to be the most important risks. The research by Addison and Seema, for instance, produced a list of 14 risks that experienced project managers considered to be important enough to require controlling on most software projects (Addison, 2002). In addition, there are other important risks, Some of them are mentioned below

1. Lack of senior management involvement
2. Continuous requirement changes
3. Unclear objectives
4. Misunderstood requirements
5. Resource usage and performance
6. Unrealistic schedules and budgets
7. Failure to manage user expectations
8. Introduction of new technology
9. Failure to gain user involvement
10. Sub-contracting
11. Inadequate knowledge/skills
12. Lack of effective project management methodology
13. Gold plating
14. Developing wrong software functions

**Others Important Risks:**

1. Late Identification of System Environment
2. Resource attrition
3. Customer Relationship Issue
4. Unavailability of documentation
5. Unclear Roles and Responsibilities

**Risk Identification and Effective Techniques:**

The following page highlights the risks which are worth controlling and effective techniques that are being used by experienced project managers for planning and controlling the risk.

Sample Demographic Data Collected

Organization Type	Project Type	No Projects	Geography	PM Exp (Yrs.)	Type of Software
Telecom Product Company	New	4	India	>7	Billing Software
Organization Support System Integrator	New	25	UK	>8	Web Based Software
Consulting Organization	Custom	202	Europe	>10	Java/J2ee based
Portal development	Custom	25	South Asia	>6	IBM web portal
Report development	New	100	North Asia	>6	Oracle
CRM practice	Custom	55	Middle east	>8	SAP
Banking Product company	New	20	USA	>8	Object Oriented Language

**Limitations**

This study focused on the risk management processes and techniques implemented by experienced project team in different IT organizations. It did not set out to establish scientific truths of those practices.. The perceptions of certain roles within the different IT organizations were canvassed. However it did not consider the perceptions of all stakeholders involved in execution of the project.

The collection of data on this subject from different roles within the organization is not the same as triangulation of the results. Triangulation of research data involves using different methods to verify the validity of the data collected.

**Conclusion**

Project risk management is an important subject due to the high failure rate of software projects. There is a wealth of information available in the literature on risk management, yet appears to be limited literature on effective risk management processes and techniques used for the execution of web based projects by different IT organizations.

Sl. No	Risk Identified	Most Effective Techniques to control the risk
1	Unclear or misunderstood scope/ objectives.	<ul style="list-style-type: none"> <li>• Use various methods and tools to capture the soft scope/business requirement. For example: Face to Face discussion, interviews, questionnaires, automated tools etc.</li> <li>• Capture Risk, Assumptions, Issues and dependencies along with business requirements.</li> <li>• Put forward all the issues in front of concerned people to have more clarification. Intermediate reviews, feedback from concern people.</li> <li>• Finally, Requirement Specification Document sign off by business user.</li> </ul>
2	Frequent Change in Requirements	<ul style="list-style-type: none"> <li>• Freeze the requirements after discussing with business stakeholders. Requirements document sign off from business &amp; Re-estimation in case of scope modification, as per change control process guidelines.</li> <li>• Assess impact of additional/changed requirements and notify the customer.</li> <li>• Delivery may be divided in drops for each known part of the overall scope.</li> <li>• Implement Change Control Process</li> <li>• Adoption of Agile Methodology</li> </ul>
3	Unrealistic schedule & budgets.	<ul style="list-style-type: none"> <li>• Regular Project Reporting metrics of progress on weekly basis.</li> <li>• Monthly review by OAG -Quality Audit Group and Quarterly PMR (Project Management Review) by senior management.</li> </ul>
4	Introduction of New Technology	<ul style="list-style-type: none"> <li>• Identify the skill gap and train the resources accordingly</li> <li>• Involve SMEs (Subject Matter Experts)</li> <li>• Conduct External review</li> <li>• Take help of existing trained resources (if any).</li> </ul>
5	Failure to manage end user expectation	<ul style="list-style-type: none"> <li>• Ensure to involve end user starting from the initiation phase by scheduling recurring (weekly/bi-weekly) calls or as per the project requirement.</li> <li>• Take end user's feedback.</li> <li>• Build relationship with end user.</li> <li>• Adopt Agile Methodology.</li> </ul>
6	Lack of senior management commitment to the project	Setting up governance model and taking buy-in from senior management before initiation of the project, as senior management ability to contribute to the project identifies real business drivers.
7	Customer Relationship Issues	<ul style="list-style-type: none"> <li>• Communication at all levels including informal.</li> <li>• Invest in extra effort beyond what was contracted in order to improve customer relationship.</li> <li>• Involve senior management</li> <li>• Build relationship and trust with customer</li> </ul>
8	Staging problems. (Implementing developed software into Test environment)	<ul style="list-style-type: none"> <li>• User Acceptance Testing</li> <li>• Check in- check out version control.</li> <li>• Development/Test/User Acceptance environment.</li> </ul>
9	Gold Plating	<ul style="list-style-type: none"> <li>• Identify Gold Plating and determine if it has additional value - turn risk into opportunity.</li> <li>• Reporting systems vs. budget.</li> <li>• Project charter "continuous improvement" for future phases.</li> </ul>
10	Subcontracting	<ul style="list-style-type: none"> <li>• Don't subcontract, instead utilize own (Employee) resource.</li> <li>• If there is no choice but to subcontract, then implement close monitoring and control process.</li> </ul>
11	Resource Usage and Performance	<ul style="list-style-type: none"> <li>• Resource planning including bi-weekly meetings tracked on intranet</li> <li>• Performance reviews as needed.</li> <li>• May have to pull people off the projects due to stress.</li> <li>• Training program plan aligned with skills needed.</li> </ul>
12	Unclear Roles and Responsibilities	Define Roles & Responsibilities and agree with impacted parties in the beginning of the project.
13	Late identification of system Environment	All the impacted environments and associated interfaces should be identified before start of the development and testing phase.

Author contention is that it is important to understand what risk management processes are used for web based projects and what practices are effective.

Author have adopted exploratory research methodology and presented live projects data. Interviews were selected as one of the appropriate method, apart from live projects data to achieve the objectives of this study. Nineteen interviews in eight IT software organizations were conducted to collect data for this study. Three different perspectives on project risk were investigated. Those were the perspectives of the delivery managers, project managers and developers. Hence large stores of rich information from key software organization have been collated. The results are analyzed and a rich set of information is presented in this study.

This study had a primary aim to investigate risk management issues and identify risk management processes and effective techniques. Specifically, the objectives were to:

1. Determine processes for identification, analysis, planning and controlling the risk &
2. Identify effective risk management techniques required for the successful delivery of web based software projects.

For the primary objective, the intention was to investigate what processes were used and how effective these processes were in some detail and in a structured way. For the secondary objective, there was an intention to explore risk management techniques with a broader scope in the hope that the work would not only provide insights but also suggest areas of particular interest for future research.

For each objective certain issues were selected for study. Each issue was investigated by posing one or two specific research questions. This breakdown of the objectives into issues and then research questions is re-stated as follows.

Objective 1 : Determine processes for identification, analysis, planning and controlling the risk &

Issue for research	Research question(s)
The risk management processes for web based projects.	RQ1 What risks are
	RQ2 What risk management Processes are used for web based project ?
The risk management controls and the extent to which they are perceived as being effective.	RQ3 How effective are management processes are perceived to be?

Objective 2 : Identify effective risk management techniques required for the successful delivery of web based software projects.

Issue for research	Research question(s)
The identification and avoidance of Risk	RQ4 What is done to identify and avoid risks?
Responses to customer – software delivery risks	RQ5 What risk management techniques do these practitioners use?
Risk management styles for customer – supplier relationship risks.	RQ6 In the suppliers estimation, do customers prefer a formal risk Management style or a flexible style?
	RQ7 What trends do suppliers perceive there are in the compromises customers are willing to make?

This study therefore set out to answers research questions, Some boundaries were necessarily placed on the scope of the study. Primarily, this study was focused on web based projects. For the purposes of this study, software organizations employing more than three but fewer than 30 people were considered to be representative of project team. In order to avoid certain industries that have inherently high-risk projects this study focused on organizations that developed web based projects for business and administrative purpose. A wide definition of development was adopted provided that the development included a high degree of novelty. This study focused on the software suppliers (rather than its „consumers and within these suppliers it considered the perspectives of people in three different roles delivery managers, project managers and developers.

A review of the study was conducted and the importance of risk management for web based software projects was reviewed. The relationship between software project success and the need for both suppliers and customers to have a relationship that involves compromise was explored in the study. The study on software risk management was then considered in terms of whether the size of the project made a

difference. The size of the project team was found to be a useful indicator of the size of the project since it provided an approximate measure of the effort required. The dynamic nature of these smaller teams in their socio-technical context was considered. A review of what the literature has to say concerning various stakeholders perspectives was summarized.

In particular the lack of literature focusing on what risk management practices are actually implemented by practitioners was emphasized. It was pointed out that the academic risk management literature focuses on primarily on large projects based on certain assumptions. These assumptions were challenged and the dearth of study considered small and medium software projects as well. The third significant gap in the study discussed the importance of the customer- supplier relationship in software project risk management.

A multi-paradigmatic approach to this study on processes and practices were considered. Interviews were selected as the appropriate research method given that the objectives were to investigate practices and how effective these practices were perceived to be. A two-phase interview approach was adopted to obtain perspectives from different roles within the organization . A list of important risks to be studied was prepared, based on prior literature that had investigated the risk management concerns of project managers experienced in dealing with different projects. Few risks were added to this list based on the Authors's experience in the industry. After the study had begun a review of progress was made at an early stage and a further, few more key risk was added to this list.

The study was split into two phases. In the first phase delivery managers of software organizations were asked for their perceptions on important risks, the techniques used to address these risks, how effective those techniques were and how they measured effectiveness. Eight organizations were selected to participate in this study for the first phase. To aid the structuring of the interviews a worksheet was developed to lead the participants through some detailed questions on what techniques they used to address each risk and how effective they found those techniques to be.

Four of those eight organizations also participated in the second phase of the study. In the second phase, project managers and developers were asked for their views on important risks, the techniques used to address those risks and how effective they considered those techniques to be. Also in the second phase of the study, four of the delivery managers were re-interviewed, The results of these interviews were analyzed and the findings also discussed. Broadly speaking, the risks that were investigated were considered important. These risks were able to be ranked into groups of relative importance. An analysis of the processes & techniques used to address each risk and the effectiveness of those techniques was presented. Salient points were raised to provide insights and suggest areas of future research. A discussion of all the results was provided which focused on themes that could be drawn out from the research findings.

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