

Do effective risk management affect organizational performance

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Abstract

Due to globalization and intense competition, risks are increasing and risk management is becoming an integral part for the success of almost every organization, especially for the software development sector because of their high-risk projects, as the risks are associated with every development step of projects undertaken. The main purpose of this study is to report on the current practices of risk management in Pakistani software development sector. Based on the data, collected from 25 organizations working in software development sector, the results indicates that risk management practices are not widely used by the organization(s), moreover most of the organizations do not have documented risk management policy properly. Therefore, these organizations cannot deal with the risks systematically and sometimes face negative consequences for the non-systematic approaches. However, few companies have implemented certain risk management techniques and are enjoying high performance.

Keywords: Pakistan, Risks, Risk Management, Organizational Performance, Software Development.

1. Introduction

Risk management is an activity within project management that is gaining importance because businesses are moving towards globalization and because of the increasing competition (Ahmed et al., 2007). The risk management process consists of a series of steps, which are establishing the context, identifying, analyzing, assessing, treating, monitoring and communicating risks, which allow continuous improvement of decision-making (Standards Australia, 1999). Boehm W. B. (1991) summarized in his study that software projects disasters and related problems could be eliminated if proper identification and resolving process for these risks could be done properly.

By implementing risk, management organization can reduce unexpected & costly surprises and effective allocation of resources could be more effective. It improves communication and provides senior management a concise summary of threats, which can be faced by the organization, thus ultimately helping them in better decision making. Throughout the world, administration of risk is something that is more often linked to the building of bridges, mechanical, engineering, and in the disaster management context. Until now, Pakistan has the same situation and management of risk is generally practiced in banking industry as per the guidelines given by state bank of Pakistan.

Furthermore, a lot of attention has been given to disaster risk management after the incident of October 2006. The project based organizations or other business organizations are not really taking steps to implement risk management. This study has been completed in the context of Pakistani software development industry to study the extent of their risk management practices and to analyze whether these practices are a source of solving

problem or are they creating further problems for the organizations. It will also highlight whether the risk management practices are having an effect on the organizational performance.

2. Literature Review

Software Risk Management

Effective management of risks involved in the software projects ensures all the aspects like successful completion of the project, customer satisfaction and it improves financial performance of the organization (Kinch J. et al., 2007). Many risks are involved while creating high quality software e.g. time and budget etc. Greater the reward must be accompanied with greater risk to make it worthwhile to take the chance. Same holds true for the software development industry, because both the possibility of reward and potential for disasters are true. The need for software risk management is illustrated in Gilb's risk principle "*If you don't actively attack the risks, they will actively attack you*" (Gilb, 1988). Therefore, to manage a software project properly, its on-time completion and to take full profit, it is crucial to identify, analyze, and control risks involved in this regard.

Boehm (1989) defines four major reasons for implementing software risk management:

1. Avoiding software project disasters, including run away budgets and schedules, defect-ridden software products, and operational failures.
2. Avoiding rework caused by erroneous, missing, or ambiguous requirements, design or code, which typically consumes 40-50% of the total cost of software development.
3. Avoiding overkill with detection and prevention techniques in areas of minimal or no risk.
4. Stimulating a win-win software solution where the customer receives the product they need and the vendor makes the profits they expect.

There are some basic risks, which are generic to nearly each software project. Even though, a basic component of risk management is inherent in good project management, but risk management differs absolutely from project management in the following ways:

Project Management	Risk Management
Designed to address general or generic risks	Designed to focus on risks unique to each project
Looks at the big picture and plans for details	Looks at potential problems and plans for contingencies
Plan what should happened and looks for ways to make it happen	Evaluate what could happen and looks for ways to minimize the damage
Plans for success	Plans to manage and mitigate potential causes of failure

As Down (1994) reported that within risk management the "*emphasis is shifted from crisis management to anticipatory management*".

Risk Management

In simple words, *Risks are potential problems*. For example, every time we cross the road, we run the risk of being hit by a car. The risk does not start until we make the commitment, until we step in the road. It ends when the problem occurs (the car hits us) or the possibility of risk is eliminated i.e. we safely step onto the sidewalk of the other side of the street (Linda westfall, 2001)

A software project may encounter various types of risks including:

1. **Technical risks** include problems with languages, project size, project functionality, platforms, methods, standards, or processes. These risks may result from excessive constraints, lack of experience, poorly defined parameters, or dependencies on organizations outside the direct control of the project team.
2. **Management risks** include lack of planning, lack of management experience and training, communications problems, organizational issues, lack of authority, and control problems.
3. **Financial risks** include cash flow, capital and budgetary issues, and return on investment constraints.
4. **Contractual and legal risks** include changing requirements, market-driven schedules, health & safety issues, government regulation, and product warranty issues.
5. **Personnel risks** include staffing lags, experience and training problems, ethical and moral issues, staff conflicts, and productivity issues.
6. **Other resource risks** include unavailability or late delivery of equipment & supplies, inadequate tools, inadequate facilities, distributed locations, unavailability of computer resources, and slow response times

According to Standards Australia (1999), risk management process consists of the following seven steps:

1. Establish the context
2. Identify risks
3. Analyze risks
4. Evaluate risks
5. Treat risks
6. Communicate and consult.
7. Monitor and review

Risk management is the activity, which comes under project management, and now a day it is gaining importance due to globalization and increased competition. Detailed techniques for the above-mentioned steps were presented and it was proposed that integration of these would result in effective project management (Ahmed et al., 2007). Raz et al. (2002) found that risk management is still at its infancy, and risk management practices are used more when the level of risk in project is high and the usage of these practices were only to meet time and budget goals.

Dedolph M. F. (2003) studied risk management in software projects as a neglected management activity and concluded that this activity is essential because it directly affects the successful factors of software development i.e. on time and on budget. Stoddard, J. (2004) concluded risk management as a daunting task for organizations and it could be made successful by motivating the individuals. Organizations that implement effective risk management become successful while others not practicing this activity proved to be unsuccessful. Mykytyn P. et al., (1999) explores the environment of information technology (IT) in organizations, identifies the probable threats, and have proposed a framework for integrated risk management in IT.

The framework can be used to guide organizations in reducing the losses resulting from the realization of threats to IT use and it will provide IT managers with a comprehensive view of their overall risk management situation because it allows them to smoothly move from one component to another by identifying and understanding the possible courses of action in the different steps. The approaches used for software development process like waterfall or evolutionary makes easy for the software projects to be highly risky. The risks associated with these projects must be resolved early and so that all the concentration will be on positive aspects of the final product. He also added his observation that though not using the proper risk management terms like risk identification, assessment or monitoring, successful project managers were good risk managers (Boehm W. B., 1999).

Baccarini D. et al (2004) identified a list of 27 risks in IT projects among which “personnel shortfalls” and “unrealistic schedule and budget” were at the top. He concluded that IT project managers should pay high attention to these issues as it not only ensures successful completion of a project but also fulfills the stake-

holder's expectations. The treatment strategies in their study were reduction, acceptance and transfer with respect to their favoritism.

2.1 Establish the Context

It is first step in risk management process for risk management (Standards Australia, 1999). Before the risk identification process, it is necessary to know that what actually the risk is, so in this phase, the aims, objectives, scope of risk management in relation to the organization are defined and criteria, resources and authorities for the treatment of risks are determined. It allows in-fact representing the status of project in several forms such as resource usage, equipment requirements, budget availability, stakeholder involvement, contract deliverables, strategic goals and schedule (Ahmed *et al.*, 2007).

2.2 Risk Identification

The identification of risk is one of the processes of risk management, which reveals and determines the possible risk facing up means of organization. It is considered to be the most important step for risk management because it provides a base for the right future work of the organization concerning the developing and the implementation of new programs for the risk control (Tchankova, L., 2002). The method chosen for the identification of the risk depends upon the culture and organization's practices etc. There must be a risk list provided as deliverable of risk identification phase suggesting at least one response to the identified risks (Chapman, C., 1997). Cerevon, F. H., (2006) view risk identification as a team work which looks at project events with respect to various risk categories, and extracting those which could have a negative impact on the project. Due to vast changes in organizational environment, the risk identification process must be continuous.

2.3 Risk Analysis

After the identification of risks, analysis is done to determine their characteristics whether they are worth of further analysis (Ahmed *et al.*, 2007). In this stage, each risk identified is assigned a significant rating by doing so it helps in better understanding the possible impact of a risk or the likelihood of it occurring. The purpose of risk analysis is to provide information to business owners to make decisions regarding priorities, treatment etc (Standards Australia, 2004). Commonly two types of risk analysis are used (Kinch, J., *et al.*, 2007).

- Quantitative
- Qualitative.

2.4 Risk Evaluation

Risk analysis provides a basis for risk evaluation in which it is decided that which risk is to be treated or accepted which action plan is better to implement. The evaluation stage usually depends on the number of risks. However, when there are only few risks then the evaluation stage might be lightweight, however, when there are many risks and the situations are complex, then the evaluation becomes difficult (Standards Australia, 2004). Moreover, in the evaluation stage risks should be examined individually as well as their combined impact on the project (Elkington P. *et al.*, 2002). In risk evaluation, different mitigation options are determined keeping in view the risk events and then most suitable option is incorporated to the risk mitigation plan (Ahmed *et al.*, 2007).

2.5 Risk Treatment

The important result of the risk management process is the risk treatment. Risks are determined which have worth of further investigation due to either of their relative importance or because of their high chance for occurring again, are treated by implementing a risk mitigation plan. Risks can be treated either through proactive approach or through reactive approach. *Reactive approach* refers to the actions initiated after the eventuation of the risks events while *proactive approach* refers to actions initiated based on chance of the occurrence of certain risks (Ahmed *et al.*, 2007).

Standards Australia (2004) identifies the following options for the treatment of risks.

- Reduce the likelihood
- Reduce the consequences
- Transfer the risk
- Accept the risk
- Avoid the risk

2.6 Risk Monitor and Review

This is an essential step in risk management process where risks are properly monitored and the effectiveness of risk treatment plan is reviewed. Risks are needed to be monitored to ensure changing circumstances do not alter the risk priorities. Very few risks will remain static, therefore the risk management process needs to be regularly repeated, so that new risks are captured in the process and effectively managed (Standards Australia, 2004).

2.7 Communicate and Consult

The whole process of risk management requires healthy contributions from all the participants within the organization (Ahmed *et al.*, 2007). Consultation and communication are key components of the risk management process involving all the stakeholders with a role to play in achieving a successful outcome of the project or any business activity (Standards Australia, 2004). In future, the face of risk communication will be two folded: First, organizations have to expand their internal communication, Secondly, the demands of external stakeholders will likely to be increasing (Lee B. Ryan *et al.*, 2005). Organizations must establish a proper communication strategy to support effective communication and consultation. Moreover, focus should be on consultation so it is important that stakeholders must be communicated throughout the risk management process and after that their perceptions must be recorded which would be helpful in decision-making.

3. Research Methodology

3.1 Purpose of the Research Study:

The main objective of this study is to analyze practices of Pakistani software organizations in context of risk management and impact of these practices on their organizational performance and identifying the opportunities of improvements. The results from this study will help the studied sector to improve their performance by filling the gaps.

Therefore, the main objective of the study is to find out

- the impact of risk management practices on organizational performance

3.2 Research Design and Sampling Technique

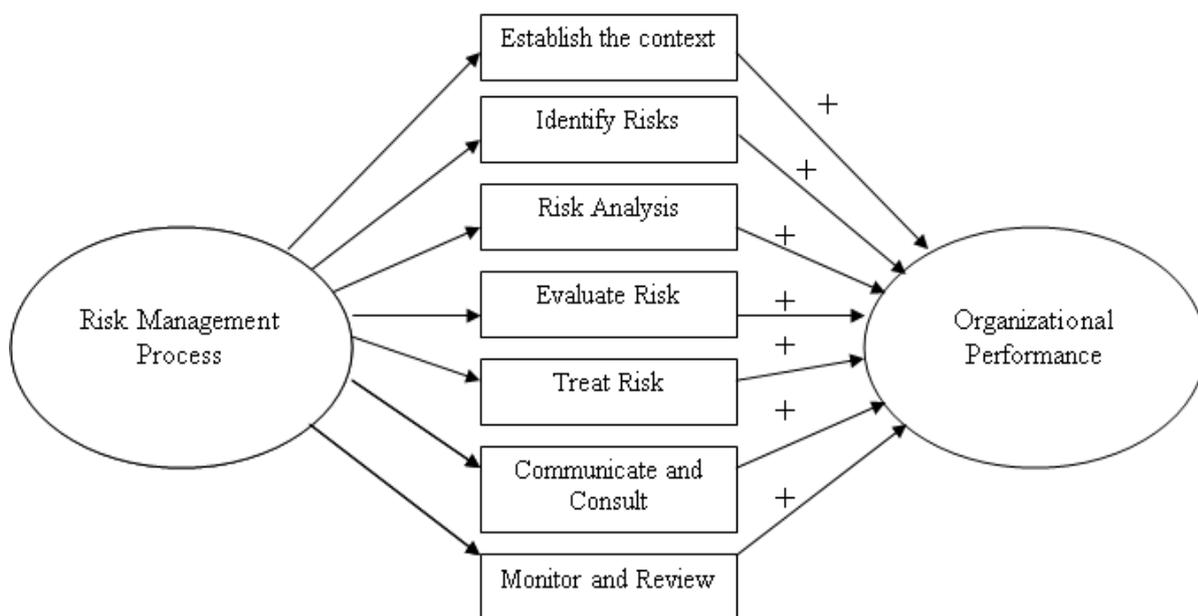
In this study convenience sampling technique has been used. This method is used to make research procedure faster by obtaining a large number of accomplished questionnaires rapidly and efficiently. Questionnaires were sent to respondents by either mail or email. Through this method, we collected a good number of responses from the people working in different software organizations. Interviews were also conducted on one-to-one basis to get a quicker response. For the survey, questionnaires designed consisted of 5 likert scale point, 5 for strongly agree, 4 for agree, 3 for neutral, 2 for disagree and 1 for strongly disagree.

3.3 Response Rate and Data Analysis Techniques

Data concerning risk management and organizational performance were collected from the professionals working in the organizations operating in the vicinity of software development sector. They were requested to reply to all the questions to the best of their knowledge. Out of 200 questionnaires, we received 135 thus comprising a response rate of 78%. Data analysis has been conducted using software SPSS 19 and MS Excel 2007 by applying techniques of Regression and Correlation.

4. Research Model

Variables included in the research model are establish the context, risk identification, risk analysis, risk evaluation, risk treatment, communication & consultation and monitoring & review. Therefore, a model



has been developed displayed below:

Figure 1 Research model

Equation tested is following:

$$\text{Equation: } y = \alpha + \beta_1 (x_1) + \beta_2 (x_2) + \beta_3 (x_3) + \beta_4 (x_4) + \beta_5 (x_5) + \beta_6 (x_6) + \beta_7 (x_7) + \varepsilon$$

$$\text{OP} = \alpha + \beta_1 (\text{ETC}) + \beta_2 (\text{RI}) + \beta_3 (\text{RA}) + \beta_4 (\text{RE}) + \beta_5 (\text{RT}) + \beta_6 (\text{CC}) + \beta_7 (\text{MR}) + \varepsilon$$

Where :

- X₁ = ETC = Establish the context
- X₂ = RI = Risk identification
- X₃ = RA = Risk analysis
- X₄ = RE = Risk evaluation
- X₅ = RT = Risk treatment
- X₆ = CC = Communication & Consultation
- X₇ = MR = Monitoring & Review

5. Hypotheses

Following hypotheses are developed:

- H1: Establishing the context has a positive impact on organizational performance.
- H2: Risk identification is having a positive impact on organizational performance.
- H3: Proper Risk analysis is having a positive impact on organizational performance.
- H4: Effective Risk Evaluation has a positive impact on organizational performance.
- H5: Proper Risk treatment of the risks is having a positive impact on organizational performance.
- H6: Effective Communication and Consultation about risk management with the stakeholders is having a positive impact on organizational performance.
- H7: Risk monitoring and review are having a positive impact on organizational performance.

6. Research Findings

For finding the strength of the relationship between several variables, “Pearson Product Moment Correlation Co-efficient” is used. In this tool, both the variables are treated symmetrically.

	<i>OP</i>	<i>ETC</i>	<i>RI</i>	<i>RA</i>	<i>RE</i>	<i>RT</i>	<i>CC</i>	<i>MR</i>
OP	1							
ETC	0.17	1						
RI	0.02	0.40	1					
RA	0.16	0.45	0.43	1				
RE	0.12	0.19	0.21	0.37	1			
RT	0.18	0.19	0.17	0.22	0.25	1		
CC	0.24	0.32	0.31	0.30	0.19	0.36	1	
MR	0.30	0.29	0.26	0.23	0.14	0.27	0.59	1

Table 1. Correlation of Variables

Correlation between monitoring & review and organizational performance is (0.30), which is highest among the other variables, which indicate its strong effect on the dependent variable, mean of monitoring & review is (3.07) and standard deviation is (0.46). Correlation between communication & consultation and organizational performance is (0.24), showing a critical role in improving organizational performance, mean of communication and consultation is (3.31) and standard deviation is (0.51).

Correlation between risk treatment and organizational performance is (0.18) along with mean (3.10) and standard deviation (0.40). Correlation between establish the context and organizational performance is (0.17), mean of establish the context is (3.44) and standard deviation is (0.52). Coefficient of Correlation between risk analysis and organizational performance is (0.16), mean of risk analysis is (3.25) and standard deviation is (0.43).

Correlation between risk evaluation and organizational performance is (0.12), mean of risk evaluation is (3.26) and standard deviation is (0.52). Correlation between risk identification and organizational performance is (0.02), mean of risk identification is (2.95) and standard deviation is (0.42). Coefficient of correlation between monitoring & review and communication & consultation is (0.59) which indicates that effective communication & consultation of risks increases the process of monitoring & review.

	<i>OP</i>	<i>ETC</i>	<i>RI</i>	<i>RA</i>	<i>RE</i>	<i>RT</i>	<i>CC</i>	<i>MR</i>
Mean	3.82	3.44	2.95	3.25	3.26	3.10	3.31	3.07
Standard Deviation	0.54	0.52	0.42	0.43	0.52	0.40	0.51	0.46

Table 2. Mean and standard deviation

We have computed sample mean, the highest mean of establish the context (3.44) is specifying that it is the main factor of risk management, which is affecting organizational performance. However, risk identification illustrated the lowest mean (2.95), showing it has least affect on organizational performance.

<i>Regression Statistics</i>		
Adjusted R Square	<i>Coefficients</i>	<i>P-value</i>
.08		
Intercept	2.24	.00004
ETC	0.09	0.40
RI	-0.19	0.14
RA	0.09	0.49
RE	0.05	0.64
RT	0.11	0.41
CC	0.07	0.54
MR	0.26	0.04

Table 3. Regression

For calculating the contribution of independent variable towards dependent variable, we adopted Multiple Regression. Table 3 confers the regression conclusions. This table shows by increasing 1 unit of monitoring and review process will increase organizational performance by (0.26) units. It means this variable is having strong impact on organizational performance. This result is significant at 4%.

7. Conclusion

Study concludes that risk management practices are still not practiced widely in the software development sector of Pakistan. There are some organizations which have systematic processes to deal with risks and it has been observed that they are enjoying high performance and market leadership. However, informal communication and monitoring was found to be the tool, which most organizations use to reduce the threats. Maybe in the near future organizations which are not using proper risk management, will start implementing these practices because when the question about effectiveness of risk management practices on organizational performance, was asked to the professionals, 90% of them replied positively that effective risk management is important for improving the performance of organization and all of them indicated the need for implementing risk management techniques in their organizations.

There are certain frameworks and steps suggested by previous studies, by implementing which organizations can reduce the probable threats and improve their performance e.g. studies conducted by Mykytyn P.P *et al.*, 1999 and Boehm W. B., 1991. The key risks, which the organizations faced, were personnel shortfalls,

incomplete requirements and changing requirements. Future research may be conducted to study the environment of Pakistan specifically and suggest steps or framework according to the environment keeping in view the risks, which are mentioned above, so making it easy for the organizations in Pakistan to implement it.

8. Recommendations

As the lack of risk management practices is observed in the study so it is recommended that organizations should have a systematic process for risk management. Steps suggested in the study of (Boehm W. P., 1991) could be beneficial in this regard. Another finding was that the organizations do not have a documented policy for risk management so this gap must be filled.

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