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Risk Organization for ERP Projects

Mehmet ERİŞ, Özalp VAYVAY
Marmara University Graduate School of Pure and Applied Sciences Engineering Management Department
Goztepe Campus, Istanbul TURKEY

ABSTRACT

Software projects' past goes back to four or more decades. We encounter the first software project risk management paper in 1991[1] and the study [2] reports that in 1995 US spent $250 billion to software projects and these projects had estimated $59 billion in cost overruns and another $81 billion had spent on canceled software projects.Although failures are tremendous, we have observed the project risks and critical success factors are given like shopping lists and so the remedies of risk factors. Very few studies exist for searching the relationships of these risk factors and the relationship between remedies and risk factors. We are trying to construct a simple model of risks and remedies borrowing concepts from systems and control theory.

I. Introduction

During early days of software utilization when computers were very scarce and ultra expensive, their usage were limited to mainly defense sector. Although these organizations have project culture and familiar with high risk, high budget projects, it is not uncommon for them to have high rate software project failures. These failures are due to lack of risk management. Lack of risk awareness causes to optimistic enthusiasm, which cause project developers to make high-risk commitments according to Boehm (1). ***"Identifying and dealing with risks early in development lessens long-tem costs and helps prevent software disasters."*** says Boehm in his study (1) that is the earliest risk management publication as best of our knowledge. Projects are managed by unrealistic optimism, and the concerns are discarded. Talking about risks is not welcomed.

Risk management is essential for the project success. For a software project to be successful, critical success factors are required. The probabilities combined with the possible negative impact of lack of critical success factors can be defined as risk factors.

Failure statistics goes back to the late 1980s and they state that 35 percent of companies faced at least one software project failure (1). One of the most cited past research is the Chaos Report 1995 (2). The Chaos Report states that US annual expenditures to IT application have risen to $250 billion, 31.1% of the projects are cancelled before completion, 52.7% of the projects are overrun than their budgets by 89%.

Importance of risk management becomes more evident as the reports present high rate of failures. The IT expenditures amount and high rate of failures signify the value of efforts to successfully manage projects. The competitive advantage offered by the IT to organizations that successfully implemented software projects makes just ignoring the IT projects impossible. The competition pressure forces the organizations to deploy IT projects. The lack of understanding of both how organizations might benefit from IT and what makes IT projects successful will result with failure. The literature gives us the Critical Success Factors and risk management helps prioritizing the critical success factors and remedies for the lack of them; and helps continuously monitoring and communicating risks.

As years followed, organizations used Information Technologies to standardize and integrate their business processes. The standardization and integration of business processes resulted with software companies to develop software packages, called Enterprise Resource Planning. Although experience built up since the early years of software projects, the project success is not still within easy reach. This is mainly because as the experience built up, the complexity of the projects are also increased.

An ERP system consists of one application, one database and user interface. It integrates and standardizes the organization's processes everything from supply-chain management, manufacturing, distribution, human resources, accounting [3].

II. Literature

The first as best of our knowledge is Boehm's work (1). He states that if there exists an explicit concern of software risks those risks would be avoided before they are realized. The lack of risk concerns will cause an optimistic attitude towards and result with unrealistic promises.

Boehm (1) describes the basic risk management process; suggests decision tree for risk response decisions; and lists the following risk factors:

1. Personnel shortfalls
2. Unrealistic schedules and budgets
3. Developing the wrong functions and properties
4. Developing the wrong user interface
5. Gold-plating
6. Continuing stream of requirements changes
7. Shortfalls in externally furnished components
8. Shortfalls in externally performed tasks
9. Real-time performance shortfalls
10. Straining computer-science capabilities

Following Boehms's (1) work, we have the Keil et al's work (4), the main contribution of Keil et al is the classification of risks according to the project team's control.

Keil et al (4) perform a Delphi Study and give the risk factors as:

1. Lack of top management commitment to the project
2. Failure to gain user commitment
3. Misunderstanding the requirements
4. Lack of adequate user involvement
5. Failure to manage end user expectations
6. Changing Scope/Objections
7. Lack of required knowledge/skills in the project personnel
8. Lack of frozen requirements
9. Insufficient/inappropriate staffing
10. Conflict between user departments

Keil et al, contribution is developing a risk categorization framework and categorizing the risks according to the framework developed. One of the dimensions of the risk categorization is the "level of control". Risk management is thought as the responsibility of the project manager and "level of control" defines if project manager has some control over mentioned risk. For instance the project manager has little control over the top risk: "Lack of top management commitment to the project".

As the ERP projects gain importance both from external pressures to implement them and both from difficulties of implementation, literature shifts to the ERP projects.
Implementing an ERP system is a careful exercise in strategic thinking, precision planning, and negotiations with departments and divisions [3].

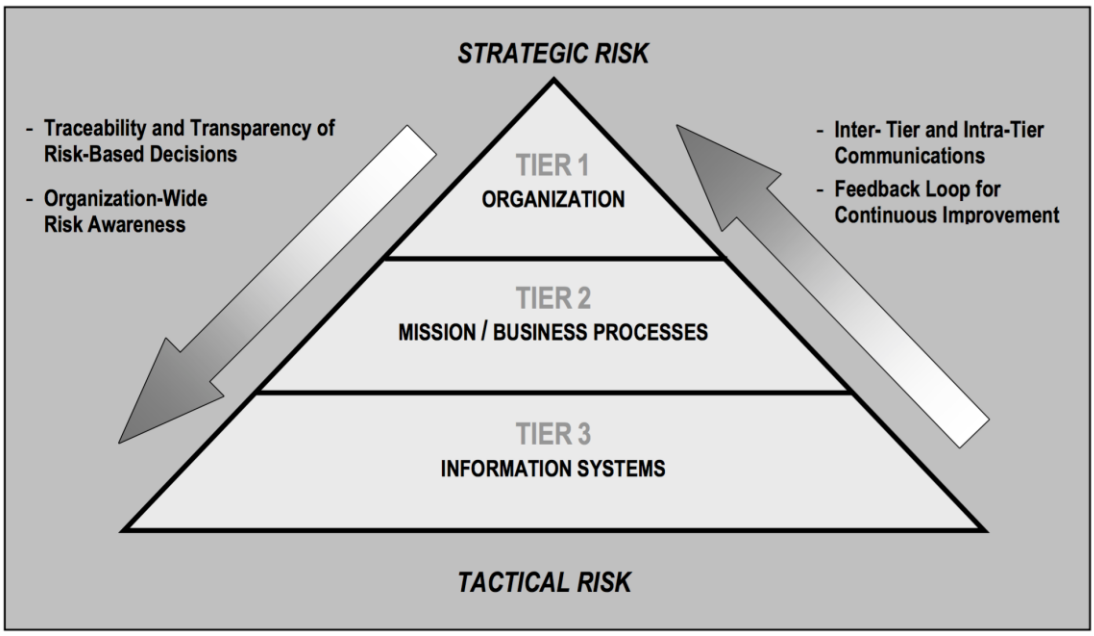
Aloini et al [5], reviews the literature and finds the most mentioned risk factors as such:

1. Inadequate selection
2. Poor project team skills
3. Low top management involvement
4. Ineffective communication system
5. Low key user involvement
6. Inadequate training and instruction
7. Complex architecture and high number of implementation modules
8. Inadequate BPR
9. Bad managerial conduct
10. Ineffective project management techniques
11. Inadequate change management
12. Inadequate legacy system management
13. Ineffective consulting services
14. Poor leadership
15. Inadequate IT system issue
16. Inadequate IT system maintainability
17. Inadequate IT supplier stability and performances
18. Ineffective strategic thinking and planning
19. Inadequate financial management

III. Risk Model

ERP projects are interdisciplinary so they both affect and are affected by multiple departments of organizations. They include technological and management aspects and these projects are affected strongly by sociological factors. So risk management of ERP projects should not be sole responsibility of the IT Department. Success and failure of an ERP project, affects the whole organization. This means that the Top Management is responsible for execution of an ERP project.

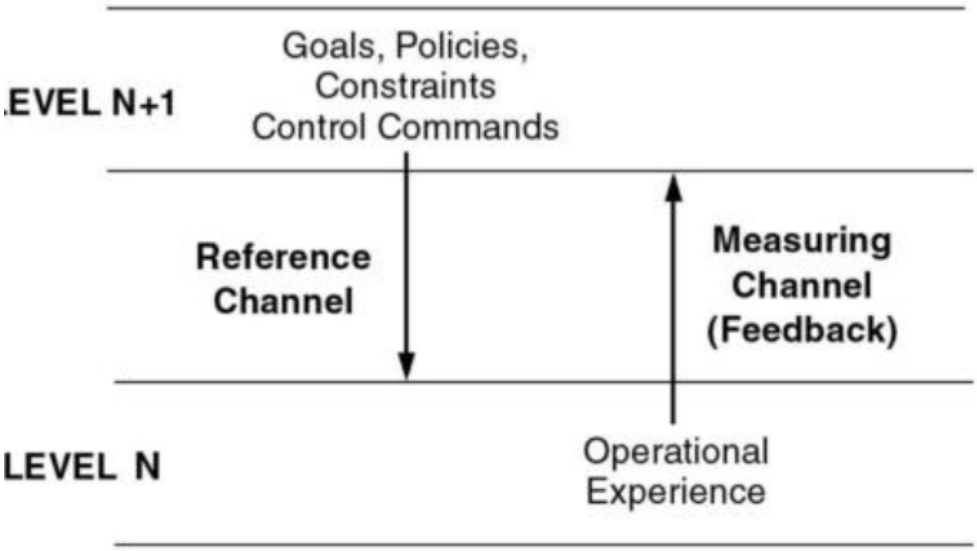
We borrow Three Tier Risk Management Structure from NIST Special Publication 800-39 Managing Information Security Risk [6],



There exist Organization at Tier 1, Mission/Business Processes at Tier 2 and Information Systems at Tier 3.

The risk executive function is required to successfully manage risks. The executive establishes risk management roles and responsibilities. We are inspired by the Keil et al'swork, classification of risk according to the level of control imposed by project team and distribute the roles and responsibilities of ERP risk management to the related tiers. The risk executive function and the tier view of organization are borrowed from NIST Special Publication 800-39 Managing Information Security Risk [6].

Tier 1 represents the Business Functions; these functions are implemented via Business Processes that reside at Tier 2. Business processes are realized within the support of the IT Systems at Tier 3.



There are control layers between tiers. Upper layers provide goals, policies and constraints and receive feedback from lower layers. Top management provides goals, resources and policies and monitors the goal achievement, resource sufficiency and usage, and policy conformance.

We have divided the responsibilities for the ERP Implementation to the four groups: (1) Top Management, (2) BPR Team, (3) IT Department and (4) Users. Top Management resides at the Top Level – Tier 1. BPR team resides at Tier 2 and IT Department and Users of ERP reside at Tier 3.

	Responsibilities	Monitoring	Required Qualities
Top Management	(1) Goal Setting Resource (2) Providing	(1) Goal Achievement (2) Resource Sufficiency and Resource Usage Efficiency	(1) Commitment-Leadership (2) Good Management Skills (3) Communication
BPR Team	(1) Redesign of Organization Processes (2) Estimating Gains from Reengineered Business Processes (3) Change Management (4) ERP Selection (Determining Suitability for Organization Processes)	(1) Compliance to Organization Business Processes (2) Monitoring Gains (Post Implementation)	(1) Personnel Skills (2) Communication (3) Organizational Knowledge (4) Analytical Skills
IT Department	(1) ERP Selection (IT Infrastructure Fit – Usability – Maintainability – Reliability - Flexibility) (2) Technical Implementation of Business Processes (3) User Training (4) Operation of ERP System	(1) IT Performance and Reliability (2) User Training Level (3) User Experience	(1) Technical Skills (2) Project Management Skills (3) People Skills
Users	(1) Compliance to ERP Processes	(1) Data Correctness	(1) Commitment (2) Responsible Usage

IV. ERP System Attributes (Criteria)

Success of the ERP Project strongly depends on the selected ERP. There are quite many studies about ERP Selection Process and Selection Criteria [8]. The most mentioned risk from literature review from Aloini et al's work (2007) is "Inadequate Selection". We have developed a framework to evaluate an ERP. There exist four aspects defining an ERP: Functionality, Quality, Compatibility, and Usability.

- **Functionality:** Functionality defines the Business Processes supported by the ERP. The main functionality of an ERP is the standardization and integration of organizational business processes. The conformance of processes of ERP packages to target organizations has the utmost importance.

- **Quality Aspects:** Quality aspects cover the reliability, maintainability, flexibility, after sales support. Reliability also includes lack of faults.

- **Compatibility Aspects:** Compatibility is about the IT infrastructure belonging to the organization required for the ERP to be operational.

- **Usability Aspects:** Usability refers to the ease of use by the users and ease of operation by the IT department. Without user friendliness, the aimed user acceptance and process efficiency could not be achieved.

Besides the risks or Critical Success Factors addressing the implementation phase of an ERP project. ERP selection is the risk belonging to the pre-implementation phase. Any ERP software that does not meet the four general requirements (Functionality, Quality, Compatibility and Usability) will cause the project to fail or fall short from target goals.

V. Assignment of Risk Factors to Organizational Units

No	Risk Factor	Responsible
1	Inadequate selection	Covered by BPR Team (Business Process Fit) Covered by IT Department (IT Infrastructure Fit)
2	Poor project team skills	Covered by Top Management (Resource Provider)
3	Low top management involvement	Top Management
4	Ineffective communication system	Organizational Quality (affects all activities)
5	Low key user involvement	IT Department User Training
6	Inadequate training and instruction	IT Department User Training
7	Complex architecture and high number of implementation	BPR and IT Department (IT infrastructure, Business Processes)

	modules	
8	Inadequate BPR	BPR
9	Bad managerial conduct	Top Management (Project Risk Governance)
10	Ineffective project management techniques	Top Management (Project Risk Governance)
11	Inadequate change management	BPR Team
12	Inadequate legacy system management	IT Department
13	Ineffective consulting services	IT Department
14	Poor leadership	Top Management
15	Inadequate IT system issue	IT Department
16	Inadequate IT system maintainability	IT Department
17	Inadequate IT supplier stability and performances	IT Department
18	Ineffective strategic thinking and planning	Top Management
19	Inadequate financial management	Top Management

VI. Conclusion

Software projects and ERP projects risk management literature gives the responsibility of risk management to the project management team. Many of the high level risks are out of project team's control. During our study we have identified the project relevant organizational units and defined their responsibilities. One of the most critical risk factor is the selection of ERP and we have defined a model describing the attributes of an ERP. Selection of suitable ERP and distribution of responsibilities of an ERP project is essential for the project success.

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