Role of risk factor in project management

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ABSTRACT

The benefits of risk management in projects are huge. You can gain a lot of money if you deal with uncertain project events in a proactive manner. The result will be that you minimize the impact of project threats and seize the opportunities that occur. This allows you to deliver your project on time, on budget and with the quality results your project sponsor demands. Also your team members will be much happier if they do not enter a "firefighting" mode needed to repair the failures that could have been prevented. In this paper we identified six common risk factors that could impact a project. Some factors are obvious, but some are not and it is important to identify them all. You are encouraged to review them all when planning for project risks. Also In this paper we describe common schedule risk factors. We give you some tools to identify risk and lower its impact, thereby saving your projects from schedule slips.

Introduction

In the past few years many organizations have initiated enterprise-wide/ERP (enterprise resource planning) projects using such packages as SAP, PeopleSoft and Oracle. These projects often represent the single largest investment in an information systems (IS) project in the histories of these companies and, in many cases, the largest single investment in any corporate wide project. These enterprise-wide/ERP projects bring about a host of new questions because they represent a new type of management challenge. The management approaches for these projects may be altogether different from the managerial approaches for traditional management information systems (MIS) projects. Some of these questions and issues are as follows [1].

(1) What are the major risk factors associated with implementing traditional MIS projects?
(2) What are the major risk factors associated with enterprise-wide information management Projects?
(3) What are the differences?
(4) What new risk factors need to be addressed in ERP projects?
(5) What are some of the risks in ERP projects that are not factors in non-ERP projects?

Most organizations have extensive experience managing traditional MIS projects, but these new ERP projects may represent new challenges and present new risk factors that must be handled differently. This paper will provide case studies of seven organizations implementing enterprise-wide/ERP projects and will provide insight into each of these questions based upon their experiences.

Risks in implementing IS projects

A simple definition of 'risk' is a problem that has not yet happened but which could cause some loss or threaten the success of your project if it did (Wiegers, 1998). A number of research studies have investigated the issue of the relative importance of various risks in software development projects and have attempted to classify them in various ways. Much has been written about the causes of IS project failures. Poor technical methods are only one of the causes and this cause is relatively minor in comparison to larger issues such as failures in communications and ineffective leadership. Studies dealing with risk factors in IS projects have described issues of organizational. t, skill mix, management structure and strategy, software systems design, user involvement and training, technology planning, project management and social commitment. Table 1 provides a summary of the risk factors in IS projects [1].

Barki [2] proposed a variety of risk factors associated with the organizational environment, including task complexity, the extent of changes, resource insufficiency and the magnitude of potential loss. In the framework developed by [3] the risks in the environment quadrant deal with issues over which the project manager may have no control, such as changing scope/objectives and conflicts between users.

In many projects, risks are identified and analyzed in a random, brainstorming, fashion. This is often fatal to the success of the project, as unexpected risks arise, which have not been assessed or planned for and have to be dealt with on an emergency basis, rather than be prepared for and defended against in a planned, measured, manner. Very early in the preparation and planning stage, it is essential that potential risks are identified, categorized and evaluated. Rather than look at each risk independently and randomly, it is much more effective to identify risks and then group them into categories, or, to draw up a list of categories and then to identify potential risks within each category. This way, common influences, factors, causes, potential impacts and potential preventative and or corrective actions, can be discussed and agreed on. Categorizing risks is a way to systematically identify the risks and provide a foundation for awareness, understanding and action. Each project will have its own structure and differences, but here are some categories that are common to most projects (to which you can add your own local, sector, or project specific, categories). I have not given deep detail here, but your project team and sponsors should be able to relate to these categories and use them in the risk assessment process. For example, with "operational resources" your team can discuss issues such as, availability, delivery timing, cost,

capability, necessary conditions for operation (eg. ground, weather, light); with "stakeholder resources" your team can identify all stakeholders and list potential risks that these stakeholders may generate, such as bad publicity from the media, delays caused by community or environmental groups, delays caused by utility companies, problems with trade unions. Related risks and potential actions must then be documented in the risk management plan and discussed at all the key stages as the project progresses. All the details and the actual action taken and the outcomes, must then be recorded and reviewed during the closure and review stage, for lessons to be learned and applied to future projects [4].

Here the question that most project managers ask: "how do we know if we can manage the risk, if it arises?" Often, sadly, no evaluation is carried out to determine the expertise, experience, capabilities of the team, individuals, organizations that would be required to deal with, manage that risk, if it occurred. As a result, if it did, the team may not be able to deal with it effectively, even though the initial forecast was that the risk could be managed. This happens frequently when the planning team is not the project team that manages the project and/or when key individuals in the original project team leave the team during the project and are replaced by individuals with different skills, experience and capabilities. The clear message here is that setting a risk tolerance level is a dangerous business. Each potential risk needs to be carefully, rigorously, analyzed and the project team, the supporting teams and individuals, the organization(s) involved in managing the project, all need to be evaluated to determine whether there is the capability to manage that risk successfully, should it arise. Where gaps in capability are identified, and then appropriate corrective action must be taken. During the project itself, this capability must be constantly monitored and, where necessary, action taken to return the level of capability to the required level.

Conflict over resources often arise during the middle to later stages of a project, because, often unexpected other, newer demands arise which are seen as being of higher priority. This can lead to resources that were originally allocated to the project being taken away, or reduced in quantity or quality, almost certainly to the detriment of the project. The answer to this dilemma is not easy, but in essence, the project management team must include "conflict over resources during the life of the project" as a major potential risk and plan for it accordingly by securing agreements and then monitoring the situation continuously. If a dispute does arise, there is a role here for the project champion and or the client to ensure that the allocated resources are not taken away.

Fundamental to many of the issues that we discuss here is the question of who should be responsible for risk assessment and management. Too often the responsibility for risk identification, assessment and management, are left to the project team, especially once the project has started. But there are other individuals and groups, including some external stakeholders, who should be continuously monitoring particular activity and feeding back regularly to the project team leader. Some are easy to identify. They include of course, the client, the sponsor, key specialists in the project team's organization, or organizations, the major external participants, such as emergency services, local authorities and contractors.

The easy way to identify other individuals and groups is to look at your list of stakeholders. Each one has a responsibility, to a greater or lesser degree, to help identify potential risk and give information on this to the project team. Again, the answer to managing the question of risk responsibility is to build discussion, planning and action, on this into the project planning and operational activity [4].

Many research studies were undertaken to determine factors influencing project success [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15]. A few research studies have empirically addressed the problem of determining the relationship between project characteristics and the appropriateness of different management tools and methods in order to increase the likelihood of project success.

Might and Fisher [10] suggested that formal project control systems have considerably more influence (both positive and negative) on project success in large projects than is the case with smaller projects. The study also showed that different project management control techniques and organizational structures are more or less appropriate depending on the project success measures used. As a consequence, they recommended that structural factors be seriously considered in a strategic sense before determining the appropriate tactical approach to **managing a project.**

Rubin and Seelig [15] studied the relationship between project characteristics, project managers' characteristics, and project success. They found that organizations tend to select their oldest and most experienced project managers to head large, high-priority projects. In their study, project manager experience had no direct relevance or influence on project success but the high priority given to larger projects did have an influence on project success. According to Rubin and Seelig, although organizations tend to select their oldest and most experienced project managers to direct large and high-priority projects, the success of these projects was influenced more by the high priority given to them than by the experience of the project managers.

Risk Management:

Nobody likes to think about risks especially early on in a project. Avoid risk management at your peril. I recommend that you produce a risk log with an action plan to minimize each risk and then publish it to all the key stakeholders in your project. Knowing what action you will take, should the worst happen, will be a great comfort [16].

The risk management procedures

The procedures of risk management have recently been published in a few papers. It was found in a previous publication that the risk management process is described slightly differently by different authors. According to SBP (2003), a risk management framework encompasses the scope, the process/system/procedures to manage risks and the roles and responsibilities of the individual related to risk management. The effective risk management framework includes the risk management policies and procedures that cover risk identification, acceptance, measurement, monitoring, reporting and control.

Benefits to managing risk

Risk management provides a clear and structured approach to identifying risks. Having a clear understanding of all risks allows an organization to measure and prioritize them and take the appropriate actions to reduce losses. Risk management has other benefits for an organization, including [17]:

• Saving resources: Time, assets, income, property and people are all valuable resources that can be saved if fewer claims occur.

- Protecting the reputation and public image of the organization.
- Preventing or reducing legal liability and increasing the stability of operations.
- Protecting people from harm.
- Protecting the environment.
- Enhancing the ability to prepare for various circumstances.
- Reducing liabilities.
- Assisting in clearly defining insurance needs.

effective risk management practice does not eliminate risks. However, having an effective and operational risk management practice shows an insurer that your organization is committed to loss reduction or prevention. It makes your organization a better risk to insure.

Role of insurance in risk management

Insurance is a valuable risk-financing tool. Few organizations have the reserves or funds necessary to take on the risk themselves and pay the total costs following a loss. Purchasing insurance, however, is not risk management. A thorough and thoughtful risk management plan is the commitment to prevent harm. Risk management also addresses many risks that are not insurable, including brand integrity, potential loss of tax-exempt status for volunteer groups, public goodwill and continuing donor support.

Why manage your risk?

An organization should have a risk management strategy because:

- People are now more likely to sue. Taking the steps to reduce injuries could help in defending against a claim.
- Courts are often sympathetic to injured claimants and give them the benefit of the doubt.
- Organizations and individuals are held to very high standards of care.
- People are more aware of the level of service to expect, and the recourse they can take if they have been wronged.
- Organizations are being held liable for the actions of their employees/volunteers.
- Organizations are perceived as having a lot of assets and/or high insurance policy limits.

Risk culture

Relationships towards superiors and an understanding of one's own duty and responsibility are intrinsic to risk handling. According to many of those interviewed, management knowledge of operational processes, the closeness of the superior to the employees, mutual trust and communication, and cooperation based on mutual respect with the immediate superiors in general have a positive influence on risk handling. Another factor is the way in which negative events or a change of circumstances is dealt with by an organization or its superiors, in particular whether these are related to a human error or an organization default. When a negative event or change of circumstances is handled exclusively as a human-related error, this promotes a culture of cover-ups and fears, said those questioned. The important thing is, therefore, that superiors exemplify a "risk culture" and that employees are not afraid to report negative findings, including human errors which occur. In addition, superiors can show by their own behaviors which risks are acceptable and which are not. Employees with many years of experience often have a finely developed sensitivity towards risk and can be supportive in the management of risk. Support by work colleagues depends on personal relationships and on the individuals concerned. In organizational units where risks have been identified, it is conspicuous that staff and management

busy themselves collectively with risk handling and understand risk management as a joint responsibility. In other organizational units, superiors delegate the responsibility for risk management to employees. Insecurity sometimes triggers a differently perceived understanding of risk management between the political and administrative levels. Apprehensions persist regarding a one-sided dialogue and the reaction towards
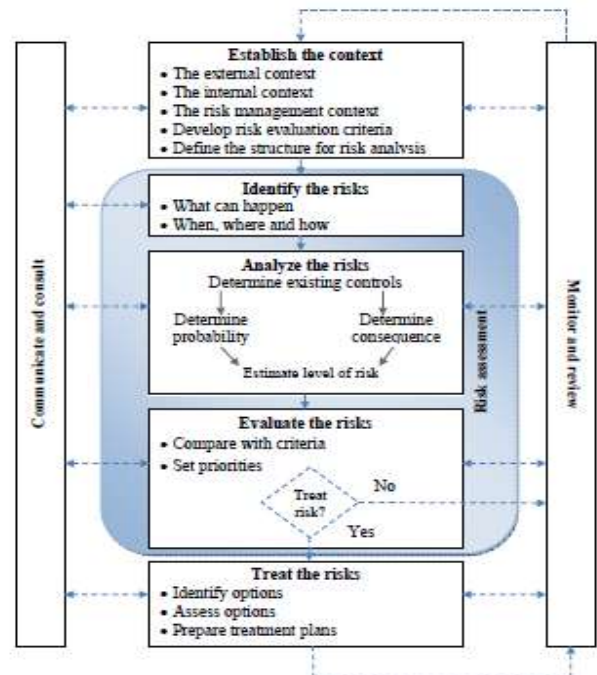

Figure1: Details of the risk management process

(Source: Standards Australia and Standards New Zealand (2004)) the disclosure of risk. In particular, the disclosure of risk to management is perceived as error confession because no appreciation accompanies it. An incentive scheme to promote a culture supporting a comprehensive view of risk management does not exist in this sense, yet is considered to be of importance. The pressure on employees to avoid errors or to cover them up is removed when supervisory bodies highlight employee risks and discuss these openly. There is a general awareness that risk management has grown in significance in recent years. Various service departments have actually named someone to be responsible for risk, or even created a special post, yet have not specified the tasks or responsibilities it entails. This trend shows that administrative risk management posts are perceived as important and identifies the potential for improvement. While in a written questionnaire the significance of risk management is highly rated and the present situation is regarded as capable of development by the majority, oral interviews in contrast show a recognizable skepticism towards the implementation of a risk management structure in all service departments. This skepticism reflects the area of conflict between a necessarily appropriate centralization of risk management and the protection of autonomy, in addition to the respect for specialist competence of decentralized organizational units. The heterogeneity of these organizational units in respect of structure, process and leadership places clear limits on the uniformity of risk management. Statements about it are inconsistent regarding how its implementation should be exactly carried out in order to meet the desired goals. Some see therein a first approach to predefining clear and concrete goals ("what"),

while the way to achieve those goals ("how") should be left to each service department. Others in turn wish that this path too was predefined. What they all agree on is that the specific differences and requirements of the implementation at any point in time are respected. The expectations of prospective risk management are that the instruments are simple to operate, fit into the existing structure and do not cause any noticeable additional administrative expenditure. What does raise concerns is examination by persons not familiar with the material. Another contributory factor to skepticism is recent circumstantial changes in the financial sector leading to a certain amount of doubt with regard to the usefulness of a risk management structure. Some even worry that risk management could cripple an already tightly structured administration. In addition, there is a fear that there may not be sufficient human, financial, specialist, and technical resources to undertake a further project such as risk management. In order for its implementation to be successful, the interviewees consider it necessary that the departments understand their task for a comprehensive risk management as a priority of their political leaders. The opinion is widely expressed that through training and professional development employees would be given the support needed to master the new tasks. The desire for support on the part of employees is frequently linked to the wish for coherent and transparent communication. The role-model function of managers and especially that of the direct superior is considered to be a prerequisite of risk management. The readiness to learn from other departments (best practice, experience exchange) is widely shared. Some welcome external support to help them reflect on their own findings and evaluations [18].

A Simple Risk Model

Before we continue to discuss risk, we need a simple model of what it is. There are two general uses for the risk evaluations, in one case, an accurate value needs to be defined, in the other, a relative measure will suffice. The use of a relative measure requires less accuracy in the estimates, since the results are only going to be compared relative to one another. Only risks that are relatively close to one another in size need be estimated more accurately. The difficulty is trying to quantify its value on some scale. A very simple model would define risk as [19]:

Risk (in $) = Probability (in %) x Impact (in $)

For a particular risk, an estimate of the probability of an event occurring is made. Then an estimate is made for the dollar impact of the event. Both of these are, in some sense, judgment calls, but often a relative measure of several risks can be made easily. If an exact value needs to be placed on a particular risk, more information will need to be obtained to improve the estimates. This, in itself, will cost an amount of dollars, which must be balanced against the judgment of the potential value of the risk. An example of a low risk calculation would be:

Estimate of Probability of Event1 = 1/1000
Estimate of Impact of Event1 = $100,000
Risk = (1/1000) X $100000 = $100
An estimate of a clearly higher risk would be:
Estimate of Probability of Event2 = 0.75
Estimate of Impact of Event2 = $100,000
Risk = (0.75) X $100000 = $75,000

In this case, clearly the latter risk is much greater than the former. The ability to rank them is easy, so the accuracy of the estimates need not be great. If the two risks came out approximately the same, it would be more important to have

more accuracy in the estimates. Usually, for Risk Management, the risks are calculated and ranked with the highest one being worked on first. This is especially true if the economic value or the risk is high.

For example, lets say the potential loss of sales to a competitor for a schedule delay was estimated as $10000 per day. A one month delay would have an impact of approximately $300,000. If the probability of a one month schedule slip according to past history was 75%, then the risk of schedule slip of one month would be $225,000. Preventing such a slip would be very valuable. This would be one risk that would be worth going after.

To complete this example, and if the estimates of impact and probability are accurate enough, we must then compare the cost of any changes to be implemented in the organization against the estimated savings of $225,000.

The entire risk management process itself brings with it a cost of implementation. This must be balanced against the estimated value of the risks to be assessed. The process relies heavily on the judgment and experience of the person and/or team that will engage in the process. It also depends on what historical data has already been gathered. Both of these factors can significantly lower the cost to accurately evaluate a particular set of risks. The more historical information that is presently available, the more effective the process will be. Finally, the entire process itself is subject to continuous improvement. At the beginning, there is more judgment than information. Later there is far more information used and far less judgment required in the estimates. Taking the steps to get the process started is probably one of the most critical decisions an organization can make.

The six risk factors

Technology projects, unlike most others, have a potential to fail to meet their goals. Over the past few years we have isolated six factors that influence the risk of failure [18].

Factor 1: Achievable goals

Failure is defined as "Results not meeting expectations". Excellent results can still fail to meet expectations, if the expectations are too high or too vague. Thus it is important to specify realistic, concrete, and written goals in order to guide the project. As important as achievable goals are well-defined goals. They should as explicit and precise as possible without being limiting. In order clarify expectations, goals must be defined in three areas: technical, schedule, and cost. The most obvious example of well-defined goals are systems that are a 1-to-1 replacement for existing systems. This never occurs, however, since a new system always has additional goals. Other ways of looking at whether goals are achievable is to consider their size, their complexity, whether they are replacing more than one existing system, how stable is the process being automated, numbers of interfaces with other systems (or this may be part of factor 4), and stability of requirements. The total duration of the project might give a clue also. Projects that take more than one year are automatically higher risk.

Factor 2: Activity type

The activity for which the technology system is targeted is a factor in the probability of success. Activities can be placed into a 2x2 matrix according to whether they are Critical or Noncritical to achieving the mission, and whether they are Focus or No focus. Focus activities are those for which the organization was founded and those staff are specialists in.

Factor 3: Resources and commitment

Resources include money and people, but might also consider computer systems, space, etc.

Factor 4: Organizational setting

Organizational Setting describes to what extent the proposed project requires cooperation and interrelationship between organizational units. In organizational theory, there are three ways that organizations can be affected by their technologies. "Long-linked" technologies imply close coordination among departments, especially time-dependent coordination. "Mediating" technologies are common standards and practices. "Intensive" technologies do not imply any relationship between departments but are used by individuals focusing on the problem at hand. Long-linked technologies are the most costly and hardest to change; intensive the least costly and easiest to change. In other words, the riskiest projects are those that require close, time-dependent interactions among organizational units. The least risky projects are those that are done by a small team of specialists, apart from the main organization. Other organizational considerations are the policies in place, methodologies (for planning, analysis, and systems development), an information architecture, etc.

Factor 5: Project participants

The most important aspect of the project participants is their experience in the use of the proposed technology. Low experience means high risk. Other aspects are their commitment to the project, their time and attention available, their skills, and their attitudes. Appointment of a single project manager who bears responsibility for success is also a factor.

Factor 6: Technology age

Technology Age describes whether the technology proposed is New, Old, or Current. The newer the technology, the higher the risk. One might also consider the availability, quality, staffing, and stability of the infrastructure, such as databases, data administration, languages and tools, networks, etc.

Conclusion

Project management as a management discipline underpins much economic activity. In industries as diverse as manufacturing, projects drive business. Project management, therefore, is emphasized as the process of making decisions and operationalizing certain strategies and tactics to bring the project to success, Applying to these techniques will help you avoid many common problems that befall many project managers. The key to good project management is communication with the project stakeholders. Never leave it too late to tell people what is happening, bad news only gets worse the longer you leave it. In this research we showed that the best project management approach varies according to the level of risk involved in a project. The importance of project goal understanding, the level of authority given to the project manager, problem handling by the project team, communication, and team support was clearly demonstrated. While many success factors center around human relationship, this study also indicated that high-risk projects should be more carefully planned, closely monitored and controlled.

The following general recommendations are made when technical risk is high:

o Emphasize team support
o Increase project manager authority
o Improve problem handling and communication
o Avoid stand-alone project structure
o Increase the frequency of project monitoring
o Use WBS, PERT/CPM, and C/SCSC
o Increase project manager authority

When schedule risk is high:

Increase the frequency of project monitoring Select the most experienced project manager Project risk should be considered from a strategic and tactical point of view when implementing a project. Project success is significantly influenced by the selected management approach.

References

[1] MARY SUMNER, Risk factors in enterprise-wide/ERP projects, Journal of Information Technology, vol. 15, 317–327, 2000.

[2] Barki, H., Rivard, S. and Talbot, J. Toward an assessment of software development risk Journal of Management Information Systems, 10(2), 203–25, 1993.

[3] Keil, M., Cule, P.E., Lyytinen, K. and Schmidt, R.C. A, framework for identifying software project risks. Communications of the ACM, 41(11), 76–83, 1998.

[4] Williams, CJ, Project Management: Risk Management, http://www.projectsmart.co.uk/project-management-risk-management.html

[5] Allen, T.J., D.M.S. Lee and M.L. Tushman. 1980. R&D Performance as a Function of Internal Communication, Project Management, and the Nature of the Work. IEEE Transactions on Engineering Management, vol. EM-27, no. I (Feb.), pp. 2-12.

[6] Aram, J.D., and S. Javian. 1973. Correlates of Success on Customer-initiated R&D Projects. IEEE Transactions on Engineering Management, vol. EM-20, no. 4 (Nov.), pp. 108-113.

[7] Dane, C.W., C.F. Gray and B.M. Woodworth. 1979. Factors Affecting the Successful Application of PERT/CPM Systems in a Government Organization. Interfaces, vol. 9, no. 5 (Nov.), pp. 94-98.

[8] Hughes, M.NX 1986. Why Projects Fail: The Effects of Ignoring the Obvious. E (Apr.), pp.l4-17.

[9] McCollum, J.K., and J.D. Sherman. 1991. The Effect of Matrix Organization Size and Number of Project Assignments on Performance. IEEE Transactions on Engineering Management, vol. 38, no. 1 (Feb.), pp. 75-78.

[10] Might, R.J., and NZA. Fisher. 1985. The Role of Structural Factors in Determining Project Management Success. IEEE Transactions on Engineering Management, vol. EM-32, no. 2 (May), pp. 71-77.

[11] Might, R. 1984. An Evaluation of the Effectiveness of Project Control Systems. EEE Transactions on Engineering Management, vol. EM-31, no. 3 (Aug.), pp. 127-137.

[12] Pinto, J.K, and D.P. Slevin. 1988. Critical Success Factors Across the Project Life Cycle. Project Management Journal, vol. XIX, no. 3 (lun.), pp. 67-75.

[13] Pinto, J.K., and S.J. Mantel, Jr. 1990. The Cause of Project Failure. IEEE Transactions on Engineering Management, vol. 37, no. 4 (Nov.), pp. 269-276.

[14] Pinto, J.K., and D.P. Slevin. Critical Factors in Successful Project Implementation. 1987. EEE Transactions on Engineering Management, vol. EM-34, pp. 22-27.

[15] Rubin, I.M., and W Seelig. 1967. Experience as a Factor in the Selection and Performance of Project Managers. IEEE Transactions on Engineering Management, vol. EM-14, no. 3 (Sep.), pp. 131-135.

[16] Prapawadee Na Ranong, Wariya Phuenngam, Critical Success Factors for effective risk management procedures in financial industries, Master Thesis Spring semester, 2009.

[17]http://www.ibc.ca/en/Business_insurance/risk_management.

[18] Caroline Brüesch, Laurence Kager, Human factors in risk management: Key factors for establishing a risk culture in public administration, Winterthur/Switzerland, March 2, 2010.

[19] Carl Angotti, David Greenstein, Ten Project Schedule Risk Factors, http://www.designshrink.com/Risk.wp.html , 1999.