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DR. BRIAN J. GALLI
• Assistant Professor of Project Management and Management Engineering
• Long Island University
• brian.galli@liu.edu

Risk Management in Project Environments: REFLECTION OF THE STANDARD PROCESS

• ABSTRACT •

This research analyzes the concept of risk management in project environments by reflecting on the best practices that make up the standard risk management process in project environments. A meta-analysis approach was used to evaluate standard tools and approaches to risk management in project management environments. The study found that regardless of the project complexity or type of risk, there is a standard risk management process that should be followed when examining risk in project environments. In any project scenario, risk management has risk probability and impact assessment to investigate the likelihood that each risk occurs. It also focuses on the potential effects that a risk will have on a project's objectives, including schedule, cost, quality, and performance. The study concludes that all project managers and organizational leaderships should know the standard risk management process in project management; it is only with a standard process that risks can be effectively identified, assessed, and mitigated.

1. INTRODUCTION

--- 1.1 Concept of Risk ---

Risk is an uncertain event or condition that, if it occurs, can have a positive or negative impact on a project's objectives. Although the concept of risk often incorporates positive and negative effects, the tools that are developed only measure and assess threats, or the negative effects. Any opportunities, the positive effects, are usually ignored in tool development. Identifying and utilizing opportunities that are provided by the market is as important as identifying and avoiding any potential threats. Whereas identifying and avoiding threats can help deter or minimize future losses, identifying and acting on opportunities facilitates profit maximization.

--- 1.2 Research Objective ---

The purpose of this study was to demonstrate how risk management impacts project management and how project related risk management should be handled. This research analyzes the concept of risk management in project environments by reflecting on the best practices that make up the standard risk management process in project environments.

--- 1.3 Contribution ---

Although there is existing research pertaining to studying of the variables in this paper, there is minimal information about the comparison and relationship between these variables. Thus, this study seeks to analyze these variables and their relationships. The results of this research study contribute to several bodies of knowledge, primarily for project and risk management. The results of this study enhance these bodies of knowledge by attempting to fill in the gaps where current research lacks ample development.

Furthermore, this study contributes by introducing new ideas for future research in both project management and risk management. The study is beneficial to the practitioners' perspectives since this research introduces ideas and strategies to deploy to be more effective in the profession. Finally, practitioners will be enlightened about the implications regarding these variables and their relationships.

The paper is organized into 4 more sections. Section 2 is the literature review of this study. Section 3 is the methodology we use to execute the study. Section 4 presents our findings, and Section 5 offers the conclusion alongside of implications, future research ideas, and general research conclusions.

2. LITERATURE REVIEW

--- 2.1 Risk Management ---

Risk management is considered the systematic process to identify, analyze, and respond to any project risk. It should balance between maximizing the probability and consequences of positive events while minimizing the probability and consequences of adverse events. Risk management is typically divided into 6 steps, those being planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control.

Risk management as a quantitative practice that began after the emergence of probability theory and statistics in the 17th century. From the 18th and into the 20th century, risk assessment was practiced in limited insurance, banking, and financial spheres. Now, methods in risk assessment are now adopted on a larger scale by medium and large-size enterprises in varying industries. With such growth comes the need for compliance.

Efforts have been made to integrate the technical and financial sides of risk management into one function. Insurance buying was the earliest and most common treatment for risk, but now reliance on it has diminished. This method did not always meet the needs to properly address rick. In some cases, other internal methods of control were more suitable. In addition to quantitative methods, qualitative ones for risk analysis do exist. Regardless, both require caution in their application (Flyvbjerg et al. 2003; Pons, 2009; Goldratt & Cox, 2004).

Risk and strategic risk management are defined in the context of uncertainty, risk, and reliability. There is some difference regarding definitions in literature (Flyvbjerg et al. 2003). They are reflected most significantly in the seminal work of Flyvbjerg (2006), and more recently pertaining to risk management standards. In risk management, the traditional emphasis is on scenarios where the probability and magnitude of outcomes are significantly negative. We are concerned not only in the probability and magnitude of outcome(s) from an undesirable event but also from desirable events. In projects, we are particularly focused on what is desirable in terms of project success and sustainability, and undesirable in terms of failure of implementation (Flyvbjerg et al. 2003).

--- 2.2 Purpose of Risk Management ---

The purpose of risk management is to ensure levels of risk and uncertainty are identified and then properly managed in a structured way. This will help determine that a potential threat to the delivery of outputs (level of resourcing, time, cost, and quality) and the realization of outcomes/benefits by the Business Owner(s) is appropriately managed for the project to be completed successfully. The objectives of risk management in

project environments are to identify, assess, and mitigate risks whenever possible, and to continuously monitor risks throughout the remainder of the project to tackle future threats and changes (Ahmed et al., 2007).

As risk management is an ongoing process during the lifecycle of a project, this Risk Management Plan and Risk Register must be considered a 'snap shot' of relevant risks at one point in time. Where required, the process of risk identification, assessment, and development of countermeasures will involve consulting the Steering Committee members, project leaders, other stakeholders, and project team members (Boehm & Turner, 2003).

3. RESEARCH METHODOLOGY

Kothari (2009) suggests that various methods should be used to improve quality in research studies. The book mentions that most research will contain too many quotations and not enough value. So, two objectives are outlined. The first is to facilitate researchers in developing appropriate methodology for their studies. The second is to ensure researchers are aware of different research methods and techniques they can employ. Therefore, this paper uses a tool from Kothari's book to conduct this research. We organize existing literature about the relationship between risk management and project management at the micro-level via a meta-analysis instead of traditional narrative literature review.

The traditional review was not used because it is qualitative instead of quantitative. It doesn't allow researchers to standardize varying methods used in the collected studies. Because researchers cannot compare estimates from different studies, substantial bias will prevail. The standard review will also yield higher-level commentary. On the other hand, meta-analysis allows researchers to synthesize, combine, and interpret vast empirical data. Researchers can standardize the studied effects, methods, control variables, and selected sample to get a thorough understanding of existing gaps and variation. Contrary to a traditional review, meta-analysis is conducted over all papers that are available internationally based off priori-defined criteria. Having a thorough review will eliminate subjective assessment and bias. Although there are advantages from meta-analysis, it does have some limitations. A meta-analysis returns a narrower range of results because it compensates for priori-defined criteria. In some cases, researchers may not find relevant studies with meta-analysis because publishers usually accept studies with significant reports, and the meta-analysis will not search for studies discrete in their findings. This issue is known as the "file drawer" problem, but it can be avoided with new methodologies that test for and eliminate it (Rosenthal, 1979; Card & Krueger, 1995; Begg & Mazumdar, 1994). Finally, when using meta-analysis, researchers may make more assumptions because they do not have to report results required to conduct the analysis. Such a lack of information leads to creating more assumptions than expected.

Before our meta-analysis, we systematically collected literature relating to our topic. Estimated coefficients were selected across studies and recalculated with a standardized method into effect sizes, indicators. The indicators were combined and regression techniques became available. Within this analytical framework, the dependent variable signifies effect sizes. Furthermore, all methodological features were used as control variables.

We used several databases, including Scopus, ISI, and Elsevier to collect studies. Many other databases were also utilized. We reviewed their reference lists and talked with experts to acquire more research. This study took 4 months, from January 2017 to April 2017. We focused primarily on reviewed articles and chapters in books and monographs. Working papers and internal reports were ignored in data collection. We used keywords and phrases to query the databases so that we produced 110 pieces of literature (N=110). We filtered the 110 with a meta-analysis.

We terminated this traditional review once we reached a saturation point in which combining keywords with new ones resulted in research we already collected. The search filters refined this meta-analysis, especially with Boolean functions of AND, OR, and NOT. The filters we developed had balanced sensitivity and precision (Taylor et al. 2003; Popay et al. 2004; Vaughan, 2004). Sensitivity is the ability to find relevant material in the database. Precision is the ability to reject irrelevant material. A filter with high sensitivity includes less and irrelevant material, whereas higher precision often rejects potentially relevant information.

The first filter was developed with higher sensitivity. Results from using this filter were used to determine how to change the sensitivity and to incorporate precision. Precision was matured based on reviewing common categories of irrelevant material collected from the searches. The best changes to the filter resulted from changing its structure, and the usage and placement of the AND and OR functions. In some ways, the filter results were less successful in relation to gray literature acquisition. Gray literature is not commercially published, and can include working papers, business documents, government, educational, institutional, and technical reports, and conference proceedings. The best way to acquire this information is through manual searching and Internet search engines.

Our systematic search strategy as outlined above helped reduce N of 110 to n of 70 (n=70). This represents 63.64% of total literature identified. Then, textual analysis was used to identify common themes and concepts in the n of 70. Textual analysis helps map and describe content, functions, and structure of all literature. It is comprised of qualitative and quantitative content analysis, both of which were employed in this study. Qualitative analysis implies that there is importance in the frequency that certain message factors occur in a text. Quantitative analysis is then the step-by-step procedure that specifically addresses key research questions.

After the text analysis, results were categorized based on themes and patterns in an affinity diagram. This diagram served as the basis for section creation in this paper. Because of this filtering and diagram, 60 articles were deemed most applicable to our topic of interest. Only articles exploring the relationship between risk management and project management were considered. Papers without a causal relationship between the two were disregarded. Therefore, we produced 43 papers on the association between risk management and project management. Authors with an analysis of more than one sample were considered independently and included. Estimates from final models were accepted, and sometimes we averaged an author's findings if they used the same dataset and model specifications but in different papers. As mentioned, the selection began with N of 70 articles. After the search procedure, we had 43 articles, 61.42% of the original population.

4. CASE STUDIES

--- 4.1. Risk Management Plan ---

Risk management is an ongoing process that continues throughout a project's lifecycle. It includes processes for risk management planning, identification, analysis, monitoring, and control. Many processes are updated throughout the lifecycle as new risks are identified. It's the objective of risk management to decrease the probability and impact of events adverse to the project. On the other hand, any event that may have a positive impact should also be exploited (Pons, 2009).

A Risk Management Plan summarizes the proposed risk management for the project. Usually, it is included as a section in the Project Business Plan. However, in larger or more complex projects, it is usually in a separate document. The Risk Management Plan is dependent on establishing a Risk Register (i.e. a central document that is create during the early stages of project planning in order to log and keep track of all of the known project risks). At a minimum, the Risk Management Plan should cover the process, which will identify, analyze, evaluate, and treat risks both initially and throughout the lifecycle of the project. It should include estimated costs (where practical), the process for transferring approved risk costs into the project budget, and the process for transferring risk mitigation strategies into the project Work Breakdown Structure (Boyer & Sovilla, 2003). A few of the other things it ought to cover include: how often the Risk Register will be reviewed including the review process and those involved; a useful tool for managing and reducing the risks identified before and during the project; and identifying the mitigation actions required for implementation of the plan and associated costing.

After planning the project, a Risk Management Plan is developed to ensure levels of risk and uncertainty are properly managed. It enables those involved with improvement of projects to manage possible risks by defining the manner in which they will be contained and the likely cost of mitigation strategies (Goldratt & Cox, 2004). The team must provide the Project Sponsor, Steering Committee, and senior management with a documented framework from which risk status can be reported on, ensure the communication of risk management issues to key stakeholders is effective, provide a mechanism for seeking and acting on feedback to encourage involvement of key stakeholders, and identify mitigation actions required for implementation of the plan. Initial risks must be identified and graded according to likelihood and seriousness early in the project lifecycle (Goldratt & Cox, 2004).

This initial risk assessment will form part of the Project Proposal/Brief or Project Business Case. Once the project is approved, the Risk Management Plan and Risk Register should be fully developed. The Risk Management Plan is developed in an iterative manner as the project progresses and as clarity in relation to potential risks emerges. Although the Project Sponsor and Steering Committee have ultimate responsibility for ensuring appropriate risk management processes are applied, the Project Manager may develop the first release with their cooperation (Glover et al., 2011).

--- 4.2 Risk Management Process ---

The risk management process is "the systematic application of management policies, procedures and practices to the tasks of establishing the context, identifying, and analyzing, evaluating, treating, monitoring and communicating risk" (Glover et al., 2011). It is best described in figure 1.

--- 4.3 Overview of the Risk Management Process ---

The Risk Management Process is undertaken to ensure that each risk identified is documented, escalated, and mitigated appropriately. Risks can be any event that may have an adverse impact on the ability of the project to meet defined goals and objectives (Emiliani, 2006).

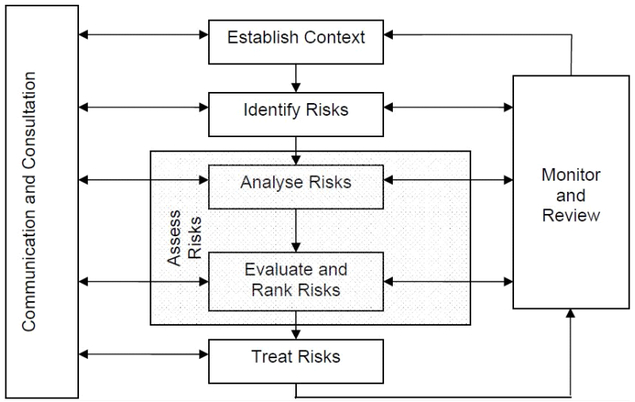

FIGURE 01. Theoretical maturity curve

Risk Management involves implementing five key processes:

- Identification of project risks
- Logging and prioritizing of project risks
- Identification of risk mitigating actions
- Assignment and monitoring of risk mitigating actions
- Closure of project risks

Figure 2 illustrates the five steps mentioned above, including identify, analyze and prioritize, plan and schedule, track and report, control, and learn. It is important to understand the process of managing each risk goes through these steps at least once. Sometimes, they cycle through the steps more than once. Furthermore, each risk has its own timeline, so it is possible that multiple risks will be in one step at any given point in time (Emiliani, 2006).

--- 4.4 Risk Management Process Steps ---

The following is a brief introduction to the six steps of the risk management process (Doyle & Thomason, 1999).

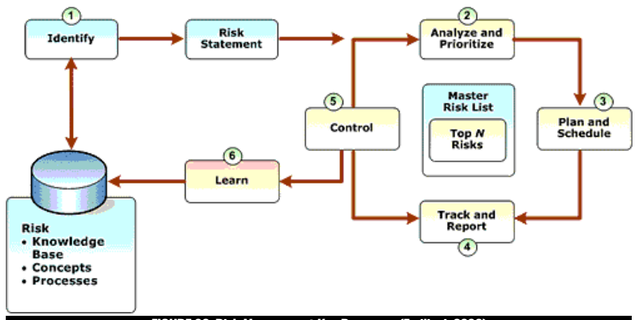

FIGURE 02. Risk Management Key Processes (Emiliani, 2006)

- Identify – An individual identifies any risks so that operations staff is aware of potential issues. Not only should risk identification be undertaken as early as possible, but also it should be repeated frequently.
- Analyze and prioritize – Analysis transforms the estimates or data about specific risks during risk identification into a consistent form to make decisions based on prioritization. Prioritization enables operations to commit resources to manage the most important risks.
- Plan and schedule – Planning takes information obtained from the risk analysis to formulate strategies, plans, change requests, and actions. Scheduling ensures these plans are approved and incorporated into the standard day-to-day processes and infrastructure.
- Track and report - Tracking monitors the status of specific risks in their respective action plans. Tracking also incorporates monitoring probability, impact, exposure, and other measures of risk for changes that may alter priority; risk plans, and ultimately service availability. Risk reporting ensures the operations staff, service manager, and other stakeholders are aware of the status of top risks and plans to manage them.
- Control - The process of executing risk action plans and their associated status reporting. It includes initiating change control requests when changes in risk status or plans can affect availability of service or service level agreement (SLA).
- Learn - Formalizing lessons learned and using tools to capture, categorize, and index that knowledge in a reusable format to share with others.

Figure 3 provides an overview of the risk processes and procedures to be undertaken to effectively manage project-related risks (Burnes, 2005).

--- 4.5 Identifying All Risks ---

Risk identification involves determining which risks are likely to impact the project the most. It involves identifying risks or threats that can lead to project outputs being delayed or reduced, outlays being advanced or increased, and output quality (fitness for purpose) being reduced or compromised (Burnes, 2005). For most large and complex projects, a number of high-level risks should be identified during the project initiation stage. They ought to be used as the basis for a more thorough analysis of risks in the project.

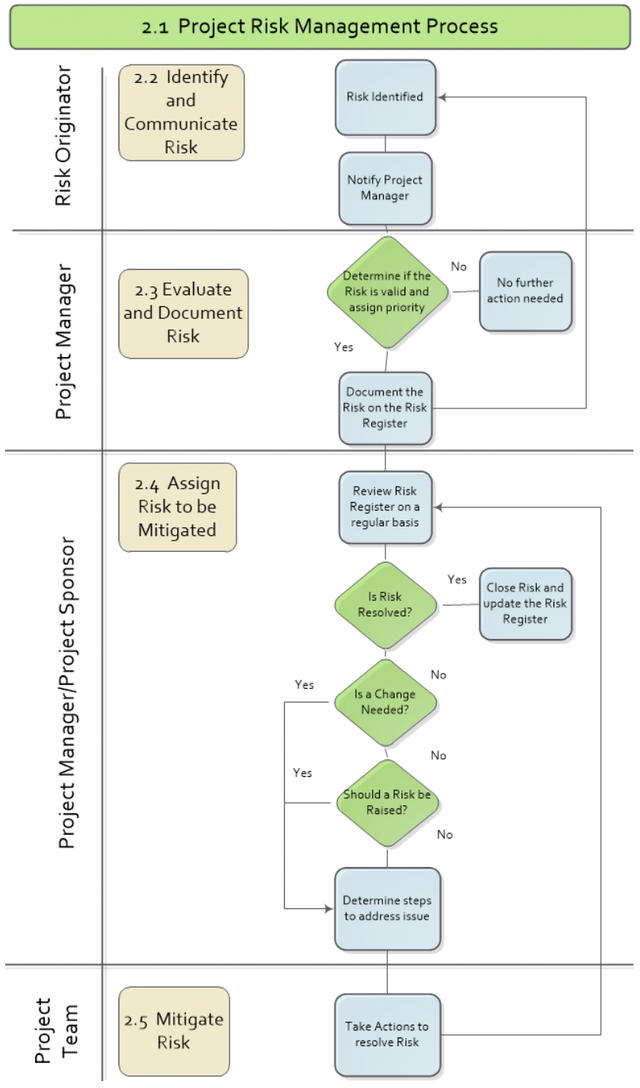

FIGURE 03. Risk Management Processes For Project-Related Risks (Burnes, 2005)

Customers, or any member of the project team, can raise a risk at any time. When this occurs, the Risk Originator should identify a risk applicable to an aspect of the project (e.g. scope, deliverables, timescales), and inform the Project Manager, preferably through a written communication (Purdy, 2010). One of the most difficult tasks is ensuring all major risks are identified. A useful way of identifying relevant risks is defining causal categories under which risks might be identified, such as corporate, business, project, and infrastructure risks. These can be broken down further into categories of environmental, economic, political, and human. Another way to categorize risk is in terms of it being external or internal. It is easy to identify a range of risks that are outside the project and are risks to the business area during output delivery, transition, or once operational mode is established. The most commonly identified risks categories are outlined below and Table 1 presents an example of a risk management assessment table (Purdy, 2010).

Operational Risks

Operational risks have an impact on the day-to-day operations of an organization. These may include Human Resources, Processes, Technology, Sales, and Safety.

Legal Risks

Legal risks impact the legal position of the organization.

Compliance and Legislative Risks

These risks impact the compliance and legislative requirements of the organization.

Market Risks

Market risks impact the position of the organization in the Market it operates in. Market risks impact the value of an investment as a result of the risk and influence of market forces.

Credit Risks

Credit risks impact the Credit ratings or credit standing of the organization.

Actuarial Risks

The risk that assumptions that actuaries implement into a model to price a specific insurance policy or pricing model may turn out wrong or somewhat inaccurate.

Financial Risks

The risk that returns on investment of the project or an investment will be different from expected.

Miscellaneous Risks

Other risks that impact the project ability to deliver in some way.

--- 4.6 Review Risk ---

Review and Monitoring should be a planned part of the risk management process that involves continuous checking or surveillance. The results should be recorded and reported externally and internally. Responsibilities for monitoring should be clearly de-

Risk Summary	Description	Preliminary Risk Rating	Risk Mitigation Description	Residual Risk Rating

TABLE 01. Example of Risk Management Assessment Table (Purdy, 2010)

fined. The firm's review processes should encompass all aspects of risk management to (Nashville, 2009):

- Ensure controls are effective and efficient in both design and operation
- Obtain further information to improve risk assessment
- Analyze and learn lessons from risk events, including near-misses, changes, trends, successes, and failures
- Detect changes in the external and internal context, including changes to risk criteria and to the risks, which may require revision of treatments and priorities
- Identify emerging risks

The team will need to test, evaluate, and update the risk management plan regularly since risks can change as the business, industry, or environment changes. Regularly reviewing the risk management plan is essential to identify new risks and monitor effectiveness of the existing risk treatment strategies (Nashville, 2009).

--- 4.7 Assigning Risk Action ---

A Risk Action Plan describes how the team will implement the organization's preferred treatment options to manage the identified risks. After completing the Risk Register, it is helpful to determine where the workshop risk can be reduced and minimized through additional management strategies. This is known as a Risk Action Plan (Achanga et al., 2006).

For a risk management action plan to be effective, it should contain specifics, including identifying risks upfront, analyzing how risks will impact a project, potential risk planning, and monitoring risk. Monitoring risk is performed by controls set within the risk management plan that deal with potential risk. Mitigation involves the identification of actions that reduce the likelihood that a threat will occur (preventative action) and/or reduce the impact of a threat

Grade	Possible Action
A	Mitigation actions to reduce the likelihood and seriousness, to be identified and implemented as soon as the project commences as a priority.
B	Mitigation actions to reduce the likelihood and seriousness, to be identified and appropriate actions implemented during project execution.
C	Mitigation actions to reduce the likelihood and seriousness, to be identified and costed for possible action if funds permit.
D	To be noted; no action is needed unless grading increases over time.
N	To be noted; no action is needed unless grading increases over time.

TABLE 02. Example of Risk Grades (Achanga et al., 2006)

that does occur (contingency action). This strategy also involves identifying the stage of the project when action should be undertaken, either prior to the start or during the project (Achanga et al., 2006.

Risk mitigation strategies to reduce the chance that a risk will be realized and/or reduce the seriousness of a risk if it is realized were developed. The following table is useful to determine how risk will be treated in terms of preparation and/or deployment of mitigation strategies during the project lifecycle (Achanga et al., 2006). Mitigation strategies are usually only prepared and/or deployed for Grades A through C, however where an existing risk graded at D appears likely to be upgraded, mitigation strategies should be prepared. Table 2 presents an example of assigning risk grades and corresponding actions.

In this section specify (Ahmed et al., 2007):

- The proportion of risk mitigation actions that are preventative (i.e. 30%);
- The proportion of risk mitigation actions that are contingency (i.e. 70%);
- Key stakeholders responsible for undertaking specific risk mitigation actions;
- Any major budgetary implications.

For any identified 'A' Grade risks, specify:

- What type of mitigation action is proposed (preventative or contingency);
- Who is responsible for undertaking the proposed action;
- Any cost implications for the project Budget.

Risk identification involves determining which threats are likely to impact the project. Such threats may lead to project outputs being delayed or reduced, outlays being advanced or increased, and/or output quality (fitness for purpose) being reduced or compromised. For most large and complex projects, a number of high-level risks should be identified during the project initiation stage. This should be used as the basis for a more thorough analysis of risks (Burnes, 2005).

One of the most difficult tasks is ensuring that all major risks are identified. A useful way to identify relevant risk is defining causal categories under which risk can be identified, such as corporate, business, project, and infrastructure risks. These can be broken down further into categories such as environmental, economic, political, and human. Another way is to categorize risk in terms of external or internal to the project (Pons, 2009).

The wording and articulation of each risk should follow a simple two-step approach:

- Consider what might be a 'trigger' event or threat (i.e. 'poor quality materials cause costs to rise'). Several triggers may reveal the same inherent risk.
- Identify the risk by using a 'newspaper headline' style statement that is short, sharp, and snappy (i.e. 'budget blow out'). Then describe the nature of the risk and the impact it has on the project if it isn't mitigated (i.e. project delayed or abandoned, expenditure to date wasted, outcomes not realized, government embarrassed, etc.).

For large or complex projects, it is beneficial to use an outside facilitator to conduct meetings or brainstorming sessions that involve the Project Manager, Project Team members, Steering Committee, and external stakeholders. Preparation can include an environmental scan and seeking views of key stakeholders (Pons, 2009).

For a small project, the Project Manager should develop the Risk Register with input from the Project Sponsor/Senior Manager and colleagues, or a small group of key stakeholders. It is easy to identify a range of risks that are outside the project. Once risks are identified, they must be analyzed by determining how they can impact success of the project (Purdy, 2010). Generally, the impact of a risk will realize one or any combination of the following consequences:

- Project outcomes (benefits) are delayed or reduced
- Project output quality is reduced
- Timeframes are extended
- Costs are increased

Once analyzed, risks should be evaluated to determine the likelihood of a risk or threat being realized, and the seriousness, or impact, should the risk occur.

'**Likelihood**' is a qualitative measure of probability to express the strength of, our belief that, the threat will emerge (generally ranked as Low (L), Medium (M) or High (H)).

'**Seriousness**' is a qualitative measure of negative impact to convey the overall loss of value from a project if the threat emerges, based on the extent of the damage (generally ranked as Low (L), Medium (M), High (H) or Extreme).

From this, risks are graded as A, B, C, D or N, according to the following matrix (Table 3):

	Seriousness				
		Low	Medium	High	EXTREME
Likelihood	Low	N	D	C	A
	Medium	D	C	B	A
	High	C	B	A	A

TABLE 03. Example of Risk Priority Matrix

The ratings for likelihood and seriousness determine a current grading for each risk that, in turn, provides a measure of the project risk exposure at the time of evaluation.

In this section specify:

- How the identified risks can potentially impact the project in terms of the four categories of consequence (i.e. x has potential to delay or reduce project outcomes/reduce output quality)
- Summaries about the distribution of risk according to the grading (number of 'A' Grade risks, 'B' Grade risks, etc.)
- A list of any 'A' Grade risks.

--- 4.8 Risk Monitoring ---

Risk Management is an iterative process that should be built into the management processes of any project. It must be closely linked with Issues Management, as untreated issues may become significant risks (Purdy, 2010). If prevention strategies are effective, some of the Grade A and B Risks should be downgraded into the project.

In this section specify (Boehm & Turner, 2003):

- How frequently a review of Risk and Issues Registers will be undertaken (i.e. fortnightly, monthly);
- Who will be involved in the review of Risk and Issues Registers (i.e. the Project team);
- How often risks will be monitored to ensure appropriate action is taken should the likelihood, or impact, of identified risks change. This also ensures that any emerging risks are appropriately dealt with;
- If the Risk Register will be maintained as a separate document or as part of the Risk Management Plan;
- How often the Steering Committee or Project Sponsor/Senior Manager will be provided with an updated Risk Register for consideration;
- How often Risk status will be reported in the Project Status Reports to the Steering Committee/Project Sponsor/Senior Manager (usually only Grade A and B risks).

--- 4.9. Roles and Responsibilities ---

4.9.1 Steering Committee

Ultimate responsibility for ensuring appropriate risk management processes are given to the Project Sponsor and Project Steering Committee. They should be involved in initial risk identification and analysis processes. The Risk Management Plan and Risk Register should provide the Project Sponsor and Project Steering Committee with clear statements of project risks and the proposed risk management strategies to enable ongoing management and regular review (Purdy, 2010).

The Steering Committee will review Grade A and B risks on a specify frequency, such as a monthly basis, via updated information provided in the Project Status Reports. As a result, they can provide advice and direction to the Project Manager. The Steering Committee will also be provided with an updated Risk Register for consideration, as required, when additional threats emerge or the likelihood or potential impact of a previously identified risk changes (Boehm & Turner, 2003).

4.9.2 Project Manager

The Project Manager will be responsible for (Purdy, 2010):

- Developing and implementing a Project Risk Management Plan;
- Organizing regular risk management sessions so that risks can be reviewed and new risks can be identified;
- Assessing identified risks and developing strategies to manage risks for each project phase as they are identified;
- Ensuring risks given an A grading are closely monitored;
- Providing regular Status Reports to the Steering Committee noting any 'A' Grade risks and specifying changes to risks identified during each phase as well as the strategies adopted to manage them.

In large or complex projects, the Project Manager may choose to assign risk management activities to a separate Risk Manager. Regardless, the project manager should still retain responsibility. It should be noted that large projects are a risk in them, and the need for the Project Manager to reassign this integral aspect of project management may be an indication that the project should be re-scoped or divided into several sub-projects overseen by a Project Director (Boehm & Turner, 2003).

4.9.3 Project Team

All members of the Project Team are responsible for assisting the Project Manager in the risk management process. This includes the identification, analysis, and evaluation of risks and continual monitoring throughout the project lifecycle (Ahmed et al., 2007).

5. CONCLUSION

This paper intended to demonstrate how risk management impacts project management and how project related risk management ought to be handled. We analyzed the concept of risk management in project environments by looking at the best practices in standard risk management. Our background literature demonstrates an increased focus on risk management in project environments. It affirms the conclusion that it is feasible and possible to integrate risk management and project management. It is found that on-going efficacy of risk management tools depends on situational variables in the operating organization. It is through our research that we suggest each aspect to be passed through risk assessment and analysis to determine the best treatments for risk.

Our findings indicate that regardless of project complexity or type of risk, there is a standard risk management process to examine risk in all types of project environments. Regardless of situation, all risk management includes risk probability and impact assessment to investigate the likelihood of risk occurring. The standard process also studies potential impacts a risk will have on project objectives, scheduling, cost, quality, and performance.

This study concluded that project managers and all organizational leaders ought to understand and know how to use the common, standard risk management process, regardless of the project environment. We demonstrated that the best way to effectively identify, assess, and mitigate risk is by utilizing a standard risk management process.

--- 5.1 Implications ---

One of the implications is that this study can be used by project managers and organizations to better understand how risk should be handled in any project environment. If these leaders understand the process, factors, and relationships of risk in project environments, then they can better guide and lead the project teams to handle those risks. As a result, they can develop more enhanced mentor programs and managerial or leadership structures to more effectively handle risk management processes, regardless of the environment and context.

This same logic is applicable to team-level implications. Thus, by being able to understand the processes, factors, and relationships of risk in differing project environments, a team can comprehend the standard process better and utilize it to manage any type of risk that occurs during the project lifecycle.

The final implication is that a comprehensive training program about risk management regardless of project environment ought to be developed. This can help the teams and leadership handle any unexpected risk situation. The training program can be built around the results of this study that better enables teams and leadership to effectively use the standard risk management process and its tools. Finally, the program can educate project leadership about how to leverage risk in a way that achieves effective risk management deployment and sustainability.

--- 5.2 Future Research Ideas ---

There are several avenues for future research. Firstly, it can explore how risk is assessed and mitigated in differing team and leadership models, such as shared leadership and self-directed teams. This can, and should, incorporate both quantitative and qualitative methods. As a result, researchers can better understand which method is optimal for identifying and controlling risk, depending on the environment and scenario.

More research can be conducted to better comprehend how various decision-making methods in team environments identify and mitigate risk. Thorough understanding of such a relationship may benefit organizations to better prepare themselves to handle risk, regardless of situation. This will improve the chances of success in mitigating risk.

Finally, a third idea for research is to examine how risk differs in different project management approaches. For example, it can be studied in the context of traditional project management and Agile/Scrum. In turn, these potential findings will enhance our understanding of how economic risk is perceived in varying environments. Also it should highlight how project managements can effectively manage economic risk when faces with different and unique project environments. ◆

• AUTHOR •

DR. BRIAN J. GALLI works as an Assistant Professor of Project Management and Management Engineering at Long Island University – Post. He holds a doctoral degree in Engineering Management from Old Dominion University, earned December 2013. He also holds a Bachelors of Science in Industrial Engineering, earned May 2007, from Binghamton University (SUNY Binghamton), as well as Masters of Science in Engineering Management, earned July 2009, from Missouri University of Science & Technology. He is a licensed professional engineer in New York State and holds a certification as a Lean Six Sigma Blackbelt, Project Management Professional (PMP), Professional in Engineering Management (PEM), and an Improvement Advisor. The author's major field of study is deployment and sustaining of continuous improvement and project management. His work has been published in a variety of different publications and has been presented at several venues and professional organizations including: Institute of Industrial & Systems Engineers (IISE), American Society for Quality (ASQ), American Quality Institute (AQI), Society for Health Systems (SHS), American Society for Engineering Management (ASEM), Project Management Institute (PMI) He currently teaches undergraduate and graduate courses in areas of continuous improvement, management engineering, and project management in the College of Management at Long Island University – Post. He also owns Apex Strategies, Ltd, a company that that specializes in continuous improvement consulting and training initiatives. He has over 9 years of experience in applying industrial engineering and continuous improvement tools and concepts in a wide variety of arenas, including healthcare, manufacturing, transactional, and service environments. He has spent several years working for Northwell Health (formerly known as North Shore LIJ Health System) in New York and 1 year in the health plan business at the EmblemHealth Service Company.

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