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Use and benefits of tools for project risk management

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Abstract

Risk management is one of the key project management processes. Numerous tools are available to support the various phases of the risk management process. We present the results of a study designed to identify the tools that are most widely used and those that are associated with successful project management in general, and with effective project risk management in particular. The study is based on a questionnaire administered to a sample of project managers from the software and high-tech industries. The response data was analyzed in order to find which tools are more likely to be used in those organizations that report better project management performance and in those that value the contribution of risk management processes. © 2000 Elsevier Science Ltd and IPMA. All rights reserved.

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1. Introduction

The management of risk in projects is currently one of the main topics of interest for researchers and practitioners working in the area of project management. A recent survey of research on the topic by Williams [1] includes 241 references. Risk management has been designated as one of the eight main areas of the Project Management Body of Knowledge (PMBOK) by the Project Management Institute, which is the largest professional organization dedicated to the project management field. Further, most training programs for project managers include a course on risk management. Within the currently accepted view of project management as a life cycle process, project risk management (PRM) is also seen as a process that accompanies the project from its definition through its planning, execution and control phases up to its completion and closure.

A number of variations of the PRM process have been proposed. Boehm [2] suggested a process consisting of two main phases: risk assessment, which includes identification, analysis and prioritization, and risk control, which includes risk management planning, risk resolution and risk monitoring planning, tracking and corrective action. Fairley [3] talks about seven steps: (1) Identify risk factors; (2) Assess risk probabilities and effects; (3) Develop strategies to mitigate identified risks; (4) Monitor risk factors; (5) Invoke a contingency plan; (6) Manage the crisis; (7) Recover from the crisis.

The Software Engineering Institute [4], a leading source of methodologies for managing software development projects, looks at project risk management as consisting of five distinct phases (identification; analysis; response planning; tracking and control) linked by an ongoing risk communications effort. In its Guide to the Project Management Body of Knowledge, the Project Management Institute [5] presents four phases of the PRM process: identification; quantification; response development and control.

Kliem and Ludin [6] describe a four-phase process (identification, analysis, control and reporting) that parallels Deming's four steps for quality management (plan, do, check and act). Chapman and Ward [7] outline a generic PRM process consisting of nine phases: define the key aspects of the project; focus on a strategic approach to risk management; identify where risks might arise; structure the information about risk

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assumptions and relationships; assign ownership of risks and responses; estimate the extent of uncertainty; evaluate the relative magnitude of the various risks; plan responses and manage by monitoring and controlling execution. It is evident from this brief review of representative PRM processes that there is general agreement regarding what is included in the process, with the differences depending on variations in the level of detail and on the assignment of activities to steps and phases.

Of course, any PRM process requires tools for its implementation. The adoption of analysis, planning, control, or management tools involves a certain investment, which in certain cases may be quite significant. This cost represents the effort required, both at a personal and at the organizational level, to understand and to learn how to use the tool, and to acquire the necessary infrastructure (technical expertise, computing aids, databases, operating procedures, etc.). A question of major relevance to any individual or organization considering the adoption or improvement of a PRM process is: which tools can provide the greatest benefits?

In this paper we present the results of a study designed to answer this question. The approach taken consisted of surveying a sample of project managers in order to find out which tools are widely used, which tools are associated with successful project management in general, and with effective project risk management in particular. In this context, the term 'tool' is given a wide meaning, including not only special purpose tools, but also practices and processes that are likely to contribute to the management of risks in projects.

In the next section we describe the methodology of the survey, including the selection of the sample and the design of the questionnaire. This is followed by a statistical analysis of the results, and by a discussion of the practical implications of the results. We conclude with some observations regarding the way the research was carried out.

2. Methodology

The data for this study was obtained by means of a questionnaire. The questionnaire, which was written in Hebrew, was distributed either personally or via e-mail to a random sample of about 400 project managers from the software and high-tech sectors in Israel during April through June 1998. At the end of the survey period there were 84 usable completed questionnaires.

The questionnaire consisted of three main sections, each containing a number of brief questions to be answered on a 0–5 scale. The first section dealt with the extent of the contribution of individual PRM tools to the project success in general. The objective here was to identify the tools that were perceived as being the most valuable by the respondents.

The second section of the questionnaire dealt with the effectiveness and efficiency of the manner in which projects are managed in the respondent's organization. With these questions we sought to investigate whether there is a relationship between the use of PRM tools and the level of performance of the project management process.

The third section addressed the contribution of a risk management process to overall project success. In particular, we wished to learn about the differences in PRM tool usage between those project managers who believe that risk management is a valuable process, and those who do not. The specific questions that were included in each of the three sections along with analysis of the responses are presented next.

3. Individual tool contribution

This section of the questionnaire consisted of a list of 38 tools and practices mentioned in the literature as contributing to project risk management. The list was developed as follows. First, an initial compilation of over 100 tools was drawn from the literature. This list was presented to a panel of five individuals who had responsibility for PRM in their organizations: three major software development companies, a company engaged in the development and manufacture of communications hardware, and a manufacturer of chemical products. These five individuals eliminated from the lists duplicated tools, combined related tools into a single one, eliminated tools that were not applied in practice and added related tools that were missing from the list, yielding the final list of 38 tools. It is interesting to note that certain tools that are normally associated with risk management, such as decision trees, fault tree analysis and influence diagrams, were reported to be seldom or not used at all, and consequently are not included in the final list.

The tools were grouped according to the five stages of the Software Engineering Institute Risk Management process [4]. We added a sixth group for tools, processes and practices of a general nature. The tools in this group, which we called 'Background', are likely to affect the manner in which risks are managed without being specifically related to one of the five stages in the PRM cycle.

The respondents were asked to rate the contribution of each tool to the project risk management process by indicating a value between 0 (no contribution at all) to 5 (critical contribution). The results for the 38 tools, divided into the six groups, appear in Table 1, along with the mean and standard deviation of the responses. Bibliographical references mentioning the tools in the risk