

Chapter 5

IT Risk Evaluation Model Using Risk Maps and Fuzzy Inference

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ABSTRACT

A risk evaluation model for IT projects using fuzzy inference is proposed. The knowledge base for fuzzy processes is built using a causal and cognitive map of risks. This map was specially developed for IT projects and takes into account the typical lifecycle and the risk taxonomy created by the Software Engineering Institute. The model was used to compute the technological risk of an e-testing project. This project was positioned on the middle level of the risk map, implying that the probability of encountering technological difficulties depends on the number of technologies used and their market maturity. A software system for validating the model was also developed.

INTRODUCTION

In a knowledge-based economy, projects are the main method of organizing economic processes. Project owners, project managers, and project teams need to make strategic decisions to achieve a “competitive edge” in the market (Kodama, 2007, p. 2). Perhaps the most important decision to be taken is choosing viable and profitable projects. Investing in a project doomed to fail means wast-

ing money, time, and valuable resources. Factors which increase the chance of project failure are called risks. The degree of risk in projects is generally measured by the amount of money lost. In most projects, risk is quantified in crisp terms, but unfortunately the reality contradicts most forecasts: “Forecasts of cost, demand, and other impacts of planned projects have remained constantly and remarkably inaccurate for decades.” (Flyvbjerg, 2006) To get truly useful information in estimating project risk, experts should analyze a distribution, not a punctual value.

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Identifying, evaluating, prioritizing, and treating risks are complex managerial challenges. Financial risks have been actively managed for a long time (Cumming & Hirtle, 2001). But the variety, number, and interactions between risks are continually increasing.

Operational and strategic risks have intensified due to the failure of control mechanisms in a very dynamic business environment. Under these circumstances, organizations recognize the importance of managing all risks, both standard and new, as many specialists noticed: Clarke and Varma (1999), Liu and Lu (2002) and McGee (2005).

A myriad of organizations (rating agencies, stock exchanges, institutional investors, shareholders, and the corporate governance) exert external pressures on corporate management to analyze risks more systematically and comprehensively. One solution is to adopt the portfolio approach (Nakagawa, Tani, Yasunobu, & Komoda, 2005): management considers the portfolio risk to be the risk to the entire organization. Risk is managed holistically, taking into account the consequences for the entire company.

There is a growing tendency to quantify risk. Risk quantification allows managers to develop “what if” scenarios and make informed decisions. Advances in technology and expertise have made this quantification possible. But despite such advances, there will always be risks that are not easily quantifiable, such as those related to human intervention. There is a continuing effort to quantify portfolio risk based on individual risks and the quantification of interactions. This can be extremely challenging if a high degree of precision is necessary, but this is not usually the case.

Over time and with practice companies become more familiar with risk and more capable of managing it. Some even seek out opportunities to assume risks. Companies understand that informed risk-taking is a means of achieving competitive advantages: “Risk management offers genuine and

significant benefits to organizations, their projects and their stakeholders, but these will never be achieved without recognition of the *importance* of managing risk at all levels in the business, matched with operational *effectiveness* in executing risk management in practice.” (Hillson, 2005)

IT PROJECTS FROM A RISKS MANAGEMENT PERSPECTIVE

The IT software industry has a high level of risk: “more than 50% of IT projects fail (according to GPM-Association from project management), 30% of IT projects are stopped before being finished (Standish Group), 50% from IT projects are 90% over-budgeted (Standish Group), the IT project products respect only 40% of the initial specifications (Standish Group).” (Gareis, 2006, p. 275-298)

The growing development of IT technologies requires a permanent improvement of software makers. Because the market demand for IT products is highly dynamic, software developers do not have time to assimilate new technologies and consequently deliver incomplete products. Software quality is the first objective sacrificed. Also, many IT projects are interrupted or experience difficulties that may lead to identity changes. In other words, each IT project is exposed to a wide array of risks.

Many researchers have tried to identify the risk sources of IT projects. Boehm (1991) noticed that the most common IT risks are: project team members are poorly trained, temporary planning and project budgets are not realistic, wrong product features are developed, interfaces are not user oriented, testing in real life situation fails. All these risks can be handled by going through the following phases: risk distribution/ evaluation (risk identification, risk analysis, risk prioritization), and risk control (risk treatment plan, risk resolution, risk monitoring). Risk identification

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