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Identifying, framing and managing uncertainties in project portfolios

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Abstract

Uncertainties in the organization, external environment and from single projects may hamper project portfolio performance unless managed properly. This paper introduces a framework on uncertainties and their management in project portfolios and pursues increased understanding on how managers can take uncertainty into account better. We explore uncertainties, how managers frame them as opportunities or threats, and the actual practice of managing them across ten R&D project portfolios. The framework on project portfolio uncertainties and their management is further refined based on the empirical results. As key contributions, we show evidence on the balanced existence of three types of uncertainties, the threat bias in their framing, and the dominance of rational, opportunity driven mechanisms of control in uncertainty management. We discuss the context-dependent practice of project portfolio management and the need to complement rational mechanisms with structural and cultural, for project portfolio management to become a dynamic capability.

Keywords: Project portfolio management; Uncertainty management; Uncertainty

1. Introduction

Companies engage in research and development (R&D) as an investment to their future product and service offering. Investments in R&D are risky and uncertain by nature: the evolution of markets and technologies cannot be foreseen, due to the variety of influencing factors. Yet, companies make efforts to optimize their R&D project portfolios with future business in mind. Project portfolios are being aligned with strategies and balanced in terms of risk particularly during project portfolio selection to positively affect future profits. The selected project portfolios evolve over time due to a number of external and internal reasons, which means that uncertainty exists and has an impact also during project portfolio deployment.

Uncertainty in R&D project portfolios is becoming an increasing concern for managers. Despite holistic project portfolio management frameworks that link projects better with strategy (Archer and Ghasemzadeh, 1999a; Benko and McFarlan, 2003; Cooper et al., 2001; Dye and Pennypacker, 1999; PMI, 2008), companies face a variety of changes and unforeseen events, both within the firm, its projects and in its external relations (e.g. Dvir and Lechler, 2004; Steffens et al., 2007). For example, markets and customers may change, organizations may be restructured, and project budgets may change in an unplanned manner (e.g. Petit and Hobbs, 2010), which all may be reflected on project portfolio results. Internally, companies still continue to carry out "pet projects" and "under the table projects", i.e., projects outside of the strategic portfolio regime (Blichfeldt and Eskerod, 2008; Loch, 2000) and they often suffer from sub-optimization at the single project level, causing resource conflicts and competition at the project portfolio level (e.g. Engwall and Jerbrant, 2003). Managers need to pay attention to uncertainties, in order to keep the R&D project portfolios on track towards the expected business profits.

Project portfolio uncertainties have been covered in previous research in three main areas. First, many studies have revealed that organizational context, particularly its complexity and project

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interdependencies cause uncertainties and require different management practices, in order to make the portfolio successful (e.g. Blichfeldt and Eskerod, 2008; Engwall and Jerbrant, 2003; Petit and Hobbs, 2010). Second, a few studies have directed attention to the environmental uncertainties such as market and technology turbulence or customer requirements that should be taken into account in project portfolio management (e.g. Olsson, 2008; Petit, 2012; Voss and Kock, 2013). Third, also changes at the single project level have been considered as relevant in generating uncertainty at the portfolio level (Nobeoka and Cusumano, 1995, 1997; Petit and Hobbs, 2010). Based on these and other recent research, it is quite apparent that uncertainty has implications on project portfolio management and the effects of uncertainty may be outside managers' sphere of influence.

The starting point for this study is the understanding that external uncertainties, intra-organizational complexities and micro-level changes at the project level all have their potential influence on project portfolios and portfolio management. This is in line with the seminal work by Galbraith (1973), who argued that the greater the uncertainty, the greater amount of information must be processed among the decision-makers. Research and everyday practice in multi-project organizations show that various kinds of changes and uncertainties do take place and they will have an impact, thereby resulting in a wide range of information needs for the managers. The uncertainties are an increasing concern for portfolio managers, but they as well as their consequences are poorly understood.

Although some studies already indicate that the rationally oriented project portfolio systems may need to be complemented with political and structural solutions to account for the information needs of managers under uncertain and complex situations (Geraldi, 2008; Kester et al., 2009, 2011; Martinsuo, 2013), few empirical studies have considered uncertainties, related information processing requirements, and how different portfolio management frameworks are used in uncertainty management (Gutierrez and Magnusson, 2014; Petit, 2012; Petit and Hobbs, 2010). In this paper, we explore the managers' experiences of different types of uncertainties in project portfolios, how they interpret and, thereby, process the information regarding uncertainties and eventually seek to make decisions in order to control those uncertainties. In particular, we are interested in how managers frame the uncertainties as opportunities vs. threats (see e.g. Dutton and Jackson, 1987) and whether such labeling is reflected in consequent actions.

The objective in this paper is to increase understanding on uncertainties and their consequences during project portfolio deployment and thereby to suggest ways in which uncertainty can be taken into account better in project portfolio management. Particularly, we seek the alternative interpretive and control strategies that managers use, when facing different types of uncertainties. We focus on three main questions:

Research question 1: What kinds of external, organizational and project-based uncertainties do managers perceive as part of project portfolio management?

Research question 2: How do managers frame the uncertainties (i.e. perceive them as opportunity vs. threat)?

Research question 3: How, through what kinds of strategies, do managers respond to the uncertainties, when managing their implications to project portfolio performance?

We respond to the call for more detailed examinations of managing changes and uncertainties at the level of the project portfolio (e.g. Martinsuo, 2013; Petit and Hobbs, 2010). The paper's unique contribution lies in unveiling the whole chain from the sources of portfolio uncertainty to the managerial framing of those uncertainties and to the consequences and taken control actions because of them. As a result, we will suggest practical ways to respond to the dynamic aspects of project portfolio management.

2. Literature review

2.1. Different sources of portfolio uncertainties

Strategic project management requires sensitivity to the context in which projects are being managed. At the level of single projects, it is increasingly clear that projects are tied to their context and history and that project managers must take this context into account in their managerial work (Artto et al., 2008; Engwall, 2003). The same kind of contextual awareness is required of strategic project portfolio management (e.g. Benko and McFarlan, 2003; Brown and Eisenhardt, 1998), although empirical research has only recently started to pay attention to portfolio uncertainties (Petit and Hobbs, 2010).

Project and portfolio managers experience uncertainty stemming from various sources in the context of the portfolio, and such sources have been mapped in different ways in previous research. For this study, we categorized the sources of uncertainty into three dimensions:

- Uncertainty from the environment due to factors external to the company that affect the portfolio.
- Uncertainty from organizational complexity due to the parent organization's systems, structures and activities that affect the portfolio and include portfolio-level issues and inter-project dependencies.
- Uncertainty from single projects due to changes, deviations and unexpected events that may take place within the portfolio at the single-project level and may have an effect at the portfolio level.

Table 1 summarizes examples of empirical research findings on how the various sources of uncertainties have appeared and affected project portfolio management. Although the different sources of uncertainties that have an influence of the project portfolio have been identified since late 1990s, only Petit and Hobbs (2010) have provided examples on each three sources of uncertainties. In all, no comprehensive presentation of the