



## Financial constraints in innovation projects: When is less more?

Martin Hoegl<sup>a,\*</sup>, Michael Gibbert<sup>b,1</sup>, David Mazursky<sup>c,2</sup>

<sup>a</sup> WHU-Otto Beisheim School of Management, Chair of Leadership and Human Resource Management, Burgplatz 2, 56179 Vallendar, Germany

<sup>b</sup> Bocconi University, Institute for Business Management, Viale Filippetti 9, 20122 Milan, Italy

<sup>c</sup> Jerusalem School of Business Administration, Hebrew University, Mt. Scopus, Jerusalem 91905, Israel

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### ABSTRACT

This article aims to reconcile the seemingly contradicting arguments put forth in different literatures regarding the role of financial resource constraints as inhibitors or enablers of innovation in organizations. Recognizing that innovative endeavors are regularly carried out through team projects, we examine when, i.e., under what conditions, financial resource constraints enable, rather than inhibit, the performance of innovation teams. Specifically, we propose that the relationship between financial constraints and innovation project performance is moderated by a bounded creativity approach, a team process that leverages the team's domain-relevant skills, an engaging project objective, strong team cohesion, and team potency.

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A widespread notion in the literature is that financial resource slack supports creativity and innovation (Amabile, 1996; Camison-Zornoza et al., 2004; Damanpour, 1991; Gassmann and von Zedtwitz, 2003). Likewise, conceptual models of team effectiveness have regularly included a team's resources as enablers, whether more passively received from the organization (Gladstein, 1984; Hackman, 1987), or more actively sought and acquired by the team (Ancona, 1990; Ancona and Caldwell, 1992).

However, the literature also points to situations in which teams innovate by 'making do with what is at hand' (e.g., Baker and Nelson, 2005; Garud and Karnoe, 2003). In fact, the new product development literature has shown that such resource-constrained projects can lead to products that are judged as highly innovative and that are very successful in the marketplace (Goldenberg et al., 2001; Moreau and Dahl, 2005).

Just how instrumental financial resource constraints can be in bringing about more innovative outcomes is best observed when different teams are struggling with the same innovation problem but have different financial resource endowments. The business history literature on the development of jet propulsion technology provides a case in point (Scranton and Gibbert, 2006). The big challenge in jet engines was and is to solve a performance dilemma: the more powerful the engine, the hotter it gets, and the more frequent are failures due to material fatigue. At the end of World War II, several American teams under General Electric and several German teams under BMW and Heinkel were competing against each other in the race to resolve this dilemma. The stakes in this race were high, given that all parties recognized jet propulsion as the next 'winning weapon' in the skies. The American team had a virtual blank check for buying whatever costly raw materials it needed to create the most heat-resistant alloys (indeed, the Cold War jet-propulsion development program cost the U.S. government nearly twice as much as the Manhattan Project). By contrast, the German engineers were denied access to state-of-the-art heat resistant alloys due to funding problems and post-war disruptions of international trade. They simply could not procure the required materials and had to make do with what was available. The

\* Corresponding author. Tel.: +49 261 6509 310; fax: +49 261 6509 319.

E-mail addresses: [hoegl@whu.edu](mailto:hoegl@whu.edu) (M. Hoegl), [michael.gibbert@unibocconi.it](mailto:michael.gibbert@unibocconi.it) (M. Gibbert), [msmazur@huji.ac.il](mailto:msmazur@huji.ac.il) (D. Mazursky).

<sup>1</sup> Tel.: +39 02 5836 3634; fax: +39 02 5836 3691.

<sup>2</sup> Tel.: +972 2 5883217; fax: +972 2 5881341.

resource-constrained German team eventually resolved the performance dilemma in a simple way: by focusing on developing more efficient ways of cooling their poorer alloys, rather than developing more heat-resistant alloys. The resulting 'bypass' technology (in which the rotor blades and other engine parts most exposed to high temperatures were hollowed out so that air could flow through them, thereby cooling them off) was in fact an analogy of the cooling system in piston engines, and is still used to this day.

This historical case exemplifies the notion of innovating under financial resource constraints, and as our discussions below will show, there are strong conceptual arguments from different literatures (i.e., cognitive psychology, creativity) for a positive influence of financial constraints on innovation, along with limited evidence from laboratory studies. However, the mere scarcity of financial resources can hardly drive innovation in real organizations. Otherwise, smaller and smaller budgets would invariably lead to equal or even greater innovative outcomes. The underlying research question (and key objective of this article), then, is when, i.e., under what conditions, financial resource constraints enable, rather than inhibit, the performance of innovation projects.

As such, this article offers two main contributions. First, the surprisingly limited prior research recognizing the potentially positive effects of resource constraints has either operated on the individual level, e.g., work in cognitive psychology and creativity research (Goldenberg et al., 2001; Moreau and Dahl, 2005), or has operated on the organizational level, e.g., work on organizational decline (Mone et al., 1998) or the effect of firm size in different competitive environments (Katila and Shane, 2005). However, most innovative endeavors in organizations are carried out through team projects (McDonough, 2000) and this conceptual analysis details how financial resource constraints operate in innovation teams.

Second, we offer propositions on moderating conditions that we expect to significantly explain when teams are successful under financial resource constraints. As we will further detail below, the role of financial resources in innovation has received very little empirical research attention. Moreover, there are sound conceptual arguments for financial resource constraints as both inhibitors and enablers of innovation, and the research findings are inconclusive (Daniel et al., 2004; Katila and Shane, 2005; Krishnan et al., 2000; Mishina et al., 2004; Mone et al., 1998).

The following discussions start with a short summary of the arguments for financial constraints either as an inhibitor or as a stimulus of innovation. We then propose moderating conditions that help explain when financial constraints are more likely to enable, rather than inhibit, innovative projects.

## 1. Financial constraints: an inhibitor or stimulus of innovation?

For the purpose of our conceptual analysis below, we adapt Mone et al.'s (1998) definition of organizational decline to specify financial resource constraints, our independent variable. As such, financial resource constraints refer to a measurable decrease in financial resources

provided by the organization to an innovation project, relative to financial resource provisions to comparable prior projects. Financial resources refer to liquid funding available to the project team, as well as monetary-equivalent resources such as technical equipment (including laboratory capacity) and prototype testing, but not human resources (i.e., the team members themselves) assigned to the project (Mone et al., 1998).

An innovation team facing financial constraints has two basic options—short of walking away from the project. It can invest effort in looking for additional resources through such strategies as engaging in 'social transactions' to ease the resource constraints directly (Bouty, 2000; Starr and MacMillan, 1990). Or the team can operate under this budgetary constraint (i.e., having a smaller resource base than in similar prior projects), making do with what it has available (Baker and Nelson, 2005). As such, our interest in this paper is not with creative processes of easing financial constraints, but with successfully working under such financially constrained conditions.

We define our dependent variable, team performance in innovative projects (such as new product development), as the degree to which a team achieves its pre-defined objectives (e.g., developing a new product to specifications) within a pre-defined timeframe and budget (Denison et al., 1996; Gladstein, 1984; Hackman, 1987; Hoegl and Gemuenden, 2001). It is worth emphasizing that our independent variable, financial constraints, differs from individual projects' budgets in that financial constraints refer to the relative decreases in financial resource provisions across projects over time.

Given those definitions, we will briefly summarize key arguments for the benefits and detriments of financial constraints in innovative projects.

### 1.1. *Less is less: financial constraints as inhibitors*

As already alluded to at the beginning of this article, a widespread notion among researchers and practitioners is that a team's access to financial resources is a key determinant of its performance (Ancona, 1990; Camison-Zornoza et al., 2004; Damanpour, 1991; Gassmann and von Zedtwitz, 2003; Gladstein, 1984; Hackman, 1987). The argument is that financial resources are needed to support such activities as experimenting, idea generation and selection, customer surveys, collaboration with suppliers and technology partners, and prototype testing. We consider this a form of financial resource elasticity. In analogy to the idea of price elasticity in marketing (indicating that variations in price lead to proportional variations in demand), resource elasticity suggests that varying degrees of financial resources result in proportional degrees of innovation performance. Thus, if financial resources are abundant, the team focuses on the challenges of its innovation project, being able to buy what is not at hand to achieve its objectives.

The flip side of the coin, teams faced with financial resource constraints may opt not to undertake activities otherwise deemed necessary. Often, such teams tend to excuse limited performance by complaining about the lack of funds, thus becoming self-declared 'victims' of their bud-

get situations (e.g., Shostack, 1988, p. 51; Kornai, 1979, p. 803). Research indicates that these teams will, out of their perception of financial inadequacy, anticipate low performance from the outset, blame the organization for failing to provide the financial resources for getting the job done, regard the project as largely ill-fated, and will thus tend to disengage from the task given (Bandura, 1977; Gibson et al., 2000; Katz-Navon and Erez, 2005; Shea and Guzzo, 1987). Taken together, many scholars investigating the effects of financial resources on team performance argue that budget constraints will inhibit, rather than enable innovation team performance.

### 1.2. *Less is more: financial constraints as enablers*

There is, however, also related research at the organizational and the individual level suggesting that budget constraints may facilitate, rather than inhibit, innovation. For instance, Katila and Shane (2005) analyze the influence of resource scarcity on innovation performance on the organizational level, comparing new firms (with less resources) and established firms (with greater resources), and specify environmental conditions under which new firms may show a higher (not just equal) rate of innovation than established ones. Likewise, Mone et al. (1998) identify organizational decline as potentially sparking innovative activities and Mishina et al. (2004) argue that the presence of financial slack may in itself be inefficient and may signal a lack of entrepreneurial spirit in the organization.

Similarly, the psychology and creativity literatures (Finke, 1990; Finke et al., 1992; Moreau and Dahl, 2005; Ward, 2004) provide conceptual and experimental evidence for the 'less is more' proposition. For instance, Ward (1994) has proposed the 'path of least resistance model'. Here, the default approach in creative tasks is to simply acquire elements that fit with existing solutions, rather than going through the more consuming process of searching for novel solutions to the problem at hand. However, as seen in the jet-engine example above, taking the path of least resistance (i.e., buying costly raw materials for better alloys) may preclude the team from identifying other, superior solutions perhaps only a little way off that path.

In a similar vein, consumer researchers find in laboratory tests that subjects are most innovative when given fewer rather than more resources for solving an innovation problem (Moreau and Dahl, 2005). The reason seems to be that the human mind can be highly productive when restricted. Limited – or differently focused – by resource constraints, individuals are more likely to recognize an unexpected idea. The heightened innovativeness of such constraints-driven solutions comes from team members' tendencies, under the circumstances, to look for alternatives beyond 'how things are normally done.' Thus, innovation teams may be more likely to find creative analogies and combinations that would otherwise be hidden under a glut of resources.

In sum, we cannot expect that financial resource constraints necessarily lead to lower performance of innovative projects. At the same time, not all innovation project teams will fare well under financial resource constraints. Given

the sound arguments on both sides of this debate, we propose the following:

**Proposition 1.** *Across a large enough sample of innovation projects, financial constraints and project performance are not systematically related (neither positively nor negatively).*

## 2. When is less more? A contingency framework

This brief overview of arguments shows that we have contradicting notions of financial resources as both positive and negative for innovation performance. This, in turn, suggests that resource scarcity may not always serve as an excuse for poor innovation performance. Yet, resource scarcity alone also does not seem to be a sufficient condition for success, or those with fewest resources would fare consistently better than those with higher resource levels. How can these apparently inconsistent perceptions of the role of financial resources in innovation projects be reconciled?

In this section, we address this question by pointing to several important causal mechanisms. We propose that these mechanisms moderate the relationship between financial constraints and team performance. Following Mone et al. (1998), we illustrate these moderators as a contingency framework, where the slope of the relationship between resource constraints and innovation team performance will vary across levels of the moderator variable.

Our choice of contingency variables reflects the notion in innovation research that innovators must overcome barriers to be successful (Gemunden, 1988; Howell, 2005; Howell and Higgins, 1990). As our discussion above indicates, financial constraints can inhibit innovation by raising barriers. More specifically, the arguments put forth in the literature in support of resource constraints as inhibitors of innovation point to (1) barriers of capability and (2) barriers of will.

Barriers of capability refer to the inability to perform work strategies that proved successful in the past (e.g., experimenting, prototype-testing, etc.) due to the reduced resource provisions (Amabile, 1996, p. 231). For instance, a smaller financial resource base than in prior projects limits the team's options regarding the purchase of innovative components, the costly exploration of new ideas, and testing of prototype parts (Damanpour, 1991).

Barriers of will refer to the motivational challenge of engaging with full resolve in a project that is afforded fewer material resources than prior successful projects absorbed. The team may perceive the project as largely ill-fated due to its reduced resource provision (e.g., Shostack, 1988, p. 51; Kornai, 1979, p. 803).

Based on prior literature, we argue below for key moderators that, through helping to overcome the barriers of capability and of will, determine when financial constraints inhibit or enable innovation team performance. Specifically, we argue that whether financial constraints enable or inhibit innovation performance depends on the team (1) applying a particular kind of creative work strategy, i.e., bounded creativity, and (2) structuring its team processes to fully leverage the team's domain-relevant skills. Moreover, financial constraints are less inhibiting if the team (3) perceives the project objective as engaging, has high levels

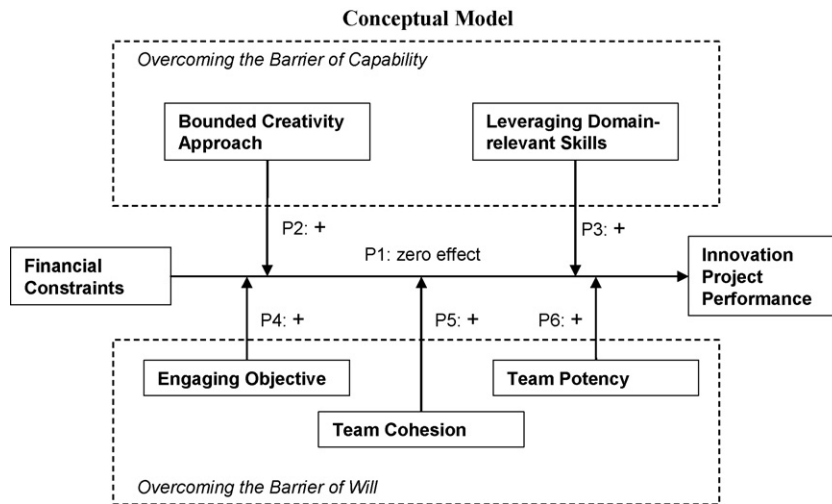


Fig. 1. Conceptual model.

of (4) team cohesion and (5) team potency. Fig. 1 depicts the conceptual model.

### 2.1. Overcoming the barrier of capability

Reduced financial provisions limit a team's ability to perform work strategies that proved successful in the past (e.g., experimenting, prototype-testing, etc.) (Amabile, 1996). For instance, a smaller budget than in prior projects constrains the team's options regarding the purchase of innovative components, the costly exploration of new ideas, and testing of prototype parts (Damanpour, 1991). This, in turn, emphasizes the innovation team's creativity to work with less than in earlier projects.

#### 2.1.1. Bounded creativity

Creativity can be defined as the production of novel and useful ideas (Ford, 1996; Woodman et al., 1993). It thus constitutes a necessary, albeit insufficient condition for innovation, which includes the successful execution of such ideas (Amabile et al., 1996). Within the creativity and innovation literatures, two broad schools of thought can be differentiated. The first literature advocates a 'thinking outside the box' approach, which subscribes to the idea that unbounded randomness is beneficial, and concludes that in order to find one good idea, hundreds, if not thousands of ideas are needed (e.g., Hamel, 2001). The fundamental logic here is that when it comes to creativity, quantity breeds quality (Thompson, 2003). The challenge in this line of thinking is (1) to find ways to increase the amount of alternative ideas at one's disposal and (2) to find efficient ways of separating the promising from less promising ideas (e.g., Nalebuff and Ayres, 2004). Methods such as brainstorming, which are based on unbounded randomness, are still often used in general management (e.g., Kiely, 1993; Rickards, 1998) and new product development (e.g., Sutton and Hargadon, 1996). For example, in an attempt to move beyond mere product extension, companies often encourage their developers to 'think outside the box' by freeing their imagination to envision products that respond

in radically new ways to customer needs (Goldenberg et al., 1999).

Notwithstanding the popularity of these unbounded methods and outside-the-box approaches, they have been questioned in numerous studies (Bouchard, 1969; Connolly et al., 1993; Diehl and Stroebe, 1987, 1991; Brown et al., 1998; Weisberg, 1992). For example, in a series of studies, Goldenberg et al., 1999, 2001, 2003) found that unbounded methods tend to lead to products that are not commensurate with the company's brand image and capabilities, and are ultimately less successful than products generated with a more structured thinking approach involving five specific 'creativity templates' (Goldenberg et al., 2003, p. 120). The main conclusion of these studies is that an excess of ideas obscures the ideation process, and randomness and irregularity impede creativity (Connolly et al., 1993; Brown et al., 1998; Stroebe et al., 1992).

The drawbacks of the 'thinking outside the box' school have led to a second stream of thought within the creativity literature, which may be called the 'thinking inside the box' school. Cognitive psychology and research in creative cognition has shown that thinking within a frame of reference enhances the creation of new ideas. Building on established concepts in cognitive psychology (encoding/retrieval, analogical thinking), this school of thought argues that individuals are more creative when limited by constraints than when faced with a 'blank slate' (Finke et al., 1992). The 'Geneplore' model in particular proposes that creativity is a highly constrained process in that it is influenced by existing knowledge frameworks in the same way that any task involving the use of categories and concepts would be influenced by those frameworks. Specifically, the Geneplore model proposes a 'function follows form' approach in which individuals retrieve from memory existing knowledge frameworks, so-called 'pre-inventive structures', which are then re-combined given the constraints of the task at hand. This is similar to the manner in which the German teams in the introductory jet-engine example retrieved from the existing piston engines a relevant pre-inventive structure, namely the airflow cooling



technology, given their lack of resources. As such, a key assumption in the work on creative cognition is that the human mind is most creative when given fewer, rather than more, alternatives to solve an innovation problem (e.g., Finke et al., 1992; Ward, 1994; Finke, 1990; Durham et al., 2000; Kelly et al., 1990).

More recently, these insights from psychology are being taken up in the marketing literature. For example, Moreau and Dahl (2005) have probed deeper into the effect of resource constraints on creativity. In experimental studies, they find that when such constraints are active, the outcomes produced in conceptual combination, in the development of new category instances, and in the production of art, are deemed more creative than when constraints are inactive. The authors explain the increased innovativeness of such constraints-driven solutions by arguing that when the demands of the innovative task are in conjunction with a perception of resource constraints, team members tend to look for alternatives beyond 'the path of least resistance' (Moreau and Dahl, 2005), which was shown to lead to higher ratings on innovativeness of the outcomes produced (e.g., Moreau and Dahl, 2005; Goldenberg et al., 1999; Ward, 1994).

In summary, we maintain that teams with a creativity approach that leans more towards bounded methods will find it not only more natural but also easier to innovate in a financially constrained environment. A bounded creativity approach is more suitable not because it represents any kind of compromise, but rather, because its underlying premise is that less is better. Therefore, when financial resources are scarce, training in, and application of, bounded creativity methods will prove useful in supporting innovation projects. For example, Goldenberg et al. (2001, 2003) find that using bounded creativity approaches including focusing on the existing product (or its use) and its characteristics and attributes not only ensures a good match with the company's current capabilities, but is possible also at a much lower cost than more comprehensive unbounded approaches. A financially constrained environment, therefore, creates a context in which teams using a bounded creative approach are more likely to be successful than teams using unbounded creativity approaches.

**Proposition 2.** *Bounded creativity positively moderates the relationship between financial resource constraints and innovation project performance.*

### 2.1.2. Leveraging domain-relevant skills

As we will further allude to in our discussions on team potency, an innovation team's level of domain-relevant knowledge and skills is one aspect likely to boost a team's self-confidence under financial resource constraints. From a creativity standpoint, Amabile (1996) argues that domain-relevant skills, i.e., knowledge about the domain as well as technical skills and talent, are a necessary prerequisite for producing novel and useful ideas. Importantly, under constrained financial resources, the notion of domain-relevant skills goes beyond domain-specific skills in that we define 'relevance' in terms of linking a team's capabilities with its task and objective. Often, this linking requires breaking functional fixedness, i.e., associ-

ating one element to one (fixed) function (Duncker, 1945). In the jet-engine example, this is illustrated in how the German teams managed to appreciate the relevance of existing skills from the piston engine (airflow cooling technology) for the new domain at hand (jet-engines).

Taking this notion to the team level, we argue that innovation teams under financial resource constraints need to structure their team process such that they leverage the multitude of regularly diverse (cross-functional) domain-relevant knowledge and skills of all team members, in order to break through the functional fixedness problem. That is, find the skill that is most relevant given the task at hand and the resources available. The extant research on collaboration in innovation projects highlights how the quality of the teams' interactive work process (i.e., teamwork) benefits their performance, particularly as innovative projects are generally characterized by high levels of equivocality and uncertainty (Adler, 1995; Daft and Lengel, 1986; Olson et al., 1995). We expect this equivocality and uncertainty to be particularly pronounced in innovative projects with constrained financial resources, where a team cannot take the 'path of least resistance' (Ward, 1994), e.g., purchase what may be needed given the task at hand. A team under financial resource constraints therefore has to leave the path of least resistance by breaking through the functional fixedness problem and identifying and leveraging those skills that are most relevant to the domain at hand.

Intensive collaboration allows the team to identify and subsequently share such domain-relevant skills (Madhavan and Grover, 1998). This is necessary in order to enhance the synergistic potential among the various interdependent parts of a project (Hitt et al., 1993). As documented in prior research (Easley et al., 2003; Hoegl and Gemuenden, 2001), teams with such high quality teamwork openly communicate relevant information (Hauptman and Hirji, 1996), coordinate their activities (Adler, 1995; Faraj and Sproull, 2000), and thus ensure that all team members can contribute their knowledge to their full potential (Seers, 1989), which, in turn, supports innovation team performance under financial constraints.

Highly diversified development teams may also, however, impose challenging conditions. While the diversity of team members is sometimes viewed favorably, as it may enhance cross-functional information sharing, creativity, and problem solving (Song and Parry, 1997), high diversity levels may hurdle decision-making processes due to differences of opinions, biases, stereotypes, and lack of team unity (Chatman and Flynn, 2001; Sethi et al., 2001). This, too, highlights the importance of supporting innovation team performance under financial constraints through structuring a team process that integrates the team both socially (by allowing time and opportunity for team members to get to know each other) and with regard to knowledge sharing and coordination (by means of collaborative work periods).

By the same token, however, it is very critical for financially constrained innovation teams to collaborate while allowing space and opportunity for individual creativity (Paulus, 2000; Thompson, 2003). An overly pronounced reliance on collaborative team processes may be suppressive of individual creativity (Brown et al., 1998; Diehl and

Stroebe, 1987, 1991; Sutton and Hargadon, 1996). Recent research therefore suggests that innovation teams must carefully balance their team processes to support creativity under financial constraints, providing for the necessary interaction to leverage the team's knowledge and skills while also allowing for phases of individual deliberation and work (Hoegl and Parboteeah, 2007).

**Proposition 3.** *Leveraging domain-relevant skills positively moderates the relationship between financial resource constraints and innovation project performance.*

## 2.2. Overcoming the barrier of will

Beyond overcoming the barrier of capability, through a bounded creativity approach and the leveraging of domain-relevant skills, a critical condition for successful innovation projects under financial constraints is the team's motivation and persistence in the face of adversity (Howell, 2005). Through team interactions, team members collectively interpret and evaluate their financial resource situation. As discussed above under the 'less is less' heading, the awareness of a significantly more constrained resource situation relative to previous projects can potentially compromise a team's level of commitment and effort for a project. We argue that three team project characteristics will drive a team's motivation to a level that supersedes the barriers of will.

### 2.2.1. Engaging project objective

A clearly specified and inherently exciting project goal will foster innovation team performance under financial resource constraints. Having specific and clear goals affects the project team by directing attention, mobilizing effort, increasing persistence, and motivating strategy development as well as knowledge and skills acquisition (Latham, 2004; Latham and Locke, 1987). The meta-analysis of 29 goal-setting studies by O'Leary-Kelly et al. (1994) provides support for a strong team-level goal-setting effect. As such, it is less important if the goal clarity comes from outside the team (e.g., the team is given a very specific objective) or the team specifies in more concrete terms a general objective it initially received. A specific team objective, then, provides a sense of direction, reducing ambiguity and uncertainty inherent in innovative tasks (Hoegl and Parboteeah, 2003; Sicotte and Langley, 2000).

Research has shown that such task focus is particularly important in situations of constrained resources, since it can channel the team's energy and foster creativity by providing a sense of 'being on a mission', rather than 'being on a treadmill' and getting nowhere (Amabile et al., 2002). The perceived relevance and significance of the project task itself can provide a strong driving force for innovation teams who would otherwise turn into self-declared 'victims' of their budget situations, as discussed above. For example, the research by O'Conner and McDermott (2004) shows that innovation is often driven by the desire to do something that might 'change the game' (or, in the jet-engine case discussed above, might even change the outcome of a major war). This illustrates that people want to be involved in something truly exciting and important, and

are therefore more likely to accept the challenge of working under financial resource constraints (Amabile, 1996).

As such, while an engaging project objective may be beneficial to any project, we argue it assumes a much more critical role in financially constrained projects. To illustrate, in the jet-engine case, while the objective of developing a technology that may change the outcome of a war may have been similar for both German and US teams, it seems to have been more effective for the former, rather than the latter. In business organizations, a similar dynamic can be observed in the case of 'underground projects', where people work on innovations without any formal consent (and budget) from management because of personal commitment to the task itself, stemming from their belief in the sense and potential benefits of the project. Sometimes, the organization picks up on these ideas later (3M's Post It Notes being a classic case) or the innovation team takes the project out of the organization (e.g., leading to the formation of SAP by 5 IBM employees or W.L. Gore & Associates [GORE-TEX] by a former DuPont employee). Thus, a common feature of such projects is the determination or willpower of the team to succeed, supporting innovation team performance under financial constraints by pushing effort and persistence to very high levels (Ghoshal and Bruch, 2003).

**Proposition 4.** *An engaging project objective positively moderates the relationship between financial resource constraints and innovation project performance.*

### 2.2.2. Team cohesion

Stronger innovation project performance under financial constraints is also more likely if the team is cohesive, emphasizing that everyone is 'in this together'. This is particularly important given that innovation teams are regularly cross-functional, including members from different functional departments such as research and development, production, logistics, quality assurance, procurement, and finance (Cooper and Kleinschmidt, 1995; McDonough, 2000), with likely pronounced functional identities (Ashforth and Mael, 1989). Team cohesion refers to the degree to which team members desire to remain on the team (Cartwright, 1968). Several forces play a part in a person's desire to stick with the team. In their meta-analysis (including 49 empirical studies) Mullen and Copper (1994) distinguish between three forces of cohesion: (1) interpersonal attraction of team members, (2) commitment to the team task, and (3) group pride—team spirit. Highly cohesive teams are more likely characterized by mutual support (Tjosvold, 1995), where team members engage in constructive discussions and support each other in pursuit of their common objective (Hoegl and Gemuenden, 2001). Likewise, cohesive teams are likely to provide for team psychological safety, a shared belief that the team is safe for interpersonal risk-taking (Edmondson, 1999), supporting innovation project performance under financial constraints through team experimentation and learning (Amabile, 1996, p. 231). Moreover, as research shows, a strong psychological bond (or shared identity) of the regularly cross-functional innovation teams depends also on outcome interdependence, i.e., the degree to which

team members are held accountable for the collective team performance, rather than their individual contributions (Sethi, 2000; Wageman, 1995). As such, cohesiveness promotes a team spirit of 'being in this together' (Sethi and Nicholson, 2001), making the team more resilient to external obstacles such as financial resource constraints (Weick, 1993). In cases of low team cohesion, however, the adversity of financial resource constraints will lead to open or concealed disengagement of the team members from the project and a subsequent further disintegration of the team.

**Proposition 5.** *Team cohesion positively moderates the relationship between financial resource constraints and innovation project performance.*

### 2.2.3. Team potency

Financial constraints pose the motivational challenge of engaging with full resolve in a project that is afforded a smaller budget than prior successful projects absorbed. The team may perceive the project as largely ill-fated due to its reduced financial resource provision (e.g., Shostack, 1988; Kornai, 1979), compromising the team's sense of potency, its assessment of whether it can successfully perform the task (Bandura, 1977; Gibson et al., 2000; Katz-Navon and Erez, 2005; Shea and Guzzo, 1987). Like an engaging project objective, team potency will influence team members' commitment to, and engagement in, the project (Shea and Guzzo, 1987). Such self-confidence, in turn, likely depends on the perceptions that the team is well-equipped on intangible resources such as the knowledge and skills of team members as well as access to information and knowledge within and outside the organization. Moreover, similar to individual self-efficacy (Bandura, 1977), team potency is also more likely if team members have successfully mastered challenging assignments before or receive early positive feedback from each other or from outside the team regarding their task strategies and progress (Cannon and Witherspoon, 2005). All such aspects are likely to foster innovation project performance under financial constraints through a can-do attitude within the team. Since prior research has shown team potency to be a driver of team performance in uncertain task environments (Katz-Navon and Erez, 2005), we argue that team potency is particularly critical to support performance in financially constrained innovation projects as it fosters the teams' commitment to the project, the level of effort team members put into it, and the persistence they display in the face of difficulty. Low levels of team potency, by contrast, would likely lead to teams declaring themselves as victims of their financial resource situations and lament the organization's failure to provide the same budget absorbed by comparable earlier projects.

**Proposition 6.** *Team potency positively moderates the relationship between financial resource constraints and innovation project performance.*

## 3. Discussion and conclusion

So, when is less more? Our response is that, on the team level, it depends. We have developed a contingency framework that identifies five variables moderating the relationship between financial resource constraints and

innovation project performance, helping to overcome the barriers of capability and will. Taken together, these variables point to conditions that help determine whether financial resource constraints inhibit or enable innovation project performance. It is worth noting that some of the proposed moderators (such as engaging project objective or team potency) may seem beneficial to most any innovative project. Our argument (guided by our research questions) is, however, that these characteristics are particularly critical in explaining innovation project performance under financial resource constraints. As such, we provide an initial step towards a theory of the role of financial resources in innovation projects. This suggests a number of contributions to the team literature. First, the conceptual model advocates a reorientation of traditional models of team effectiveness, which have regularly included financial or material resources as enablers (Gladstein, 1984; Hackman, 1987). The traditional mindset in much of the team literature is not surprising, since it is quite intuitive to think that a team's access to financial resources represents a key determinant of its performance. This is particularly true for innovation projects: The dominant logic in the literature is that financial resource slack, rather than constraint, supports innovation (Camison-Zornoza et al., 2004; Damanpour, 1991; Gassmann and von Zedtwitz, 2003). However, the resource-driven mindset has its limitations, as it can lead to complacency and can lure teams into taking the path of least resistance (i.e., simply buying components that fit with existing solutions, rather than searching for novel solutions to the problem at hand, e.g., Ward, 1994). Thus, our contingency framework provides an impulse to the team literature by suggesting a more differentiated perspective on the resource constraints-innovation relationship.

Second, our conceptual model emphasizes the importance of well-researched team attributes and processes such as cohesion and potency (Katz-Navon and Erez, 2005; Mullen and Copper, 1994). Prior empirical research in the specific domain of innovation teams has regularly not included financial resources (e.g., Faraj and Sproull, 2000; Hoegl and Gemuenden, 2001; Sethi and Nicholson, 2001). Our model therefore contributes to this work by identifying how such team characteristics gain particular relevance in financially constrained innovation teams.

Third, our conceptual model complements prior theoretical and empirical work that has focused on how teams can escape financial resource constraints by acquiring additional resources from elsewhere in the organization or beyond. Ancona (1990) and Ancona and Caldwell (1992), for instance, have specified team roles aimed at marketing the team's project and ensuring support also in terms of financial resource provisions. Likewise, scholars have specified individual 'championing' roles in the innovation process aimed at similar objectives (Howell, 2005; Howell and Higgins, 1990) as well as creative ways of using under-utilized resources to overcome constraints (Bouty, 2000; Starr and MacMillan, 1990). These prior contributions start from what we call the resource-driven mindset (i.e., more is more) and suggest ways to better one's financial resource endowments. This article, by contrast, identifies contingencies supporting innovation project performance under

financial constraints. Understanding these contingencies will be critical for managers of innovation teams in deciding if and when they want to adapt the financial resources of their project teams.

Beyond these implications for the team innovation literature, our conceptual discussions have integrated insights from the extant literature on the individual and organizational level. As such, this paper also offers implications for these bodies of work. With regard to the individual level, our conceptual model contributes to the creativity literature which starts from the assumption that 'less is more' (e.g., Finke et al., 1992; Goldenberg et al., 2001). However, due to the interdisciplinary nature and complexity of innovation projects, which often exceeds the expertise of the individual, most innovative endeavors are done in teams (McDonough, 2000). The processes we detail here make a contribution by pointing to important team-level variables that provide the context for individual-level attributes and processes, such as, for instance, creative cognition under constraints as discussed in the 'less is more' school of thought within the creativity literature (e.g., Finke et al., 1992; Ward, 1994). Moreover, since our conceptual model investigates team-level processes, it does not look into questions such as the team-internal distribution of, for instance, domain-relevant skills in the team (Hoegl and Parboteeah, 2007). This provides avenues for important further research.

With regard to the organizational level, the organizational decline literature investigates under what conditions an erosion of an organization's resource base due to decline can foster innovation (the so-called 'necessity is the mother of invention school', e.g., Mone et al., 1998). Confusingly, this literature consistently advocates that slack (i.e., many uncommitted financial resources) is needed from somewhere in the organization in order for decline to foster innovation. For example, Mone et al. (1998) argue that when uncommitted resources are high at the beginning of a decline period, "the organization has liquid assets that can be used to pay the costs of innovation [...]. However, if uncommitted resources are low, managers have fewer liquid assets with which to fund the costs of innovation" (Mone et al., 1998, p. 123). Thus, while at first sight part of the 'less is more' school of thought, this literature actually puts forward the conservative argument in which financial resource slack, not scarcity, is the driver of innovation. As such, our arguments contribute to the literature on organizational decline in that they point to conditions under which teams in declining organizations can thrive even when there are few uncommitted financial resources (Daniel et al., 2004).

The framework presented here also helps shed light on another issue on the organizational level: the sometimes vastly different return-on-investment for innovation in large (i.e., 'rich') as opposed to small (i.e., financially constrained) organizations (Camison-Zornoza et al., 2004; Damanpour, 1991; Daniel et al., 2004). Recently, there has been some work detailing the influence of financial resource scarcity on innovation performance on the organizational level, comparing new firms (with less financial resources) and established firms (with greater financial resources). This work specifies environmental conditions

under which new firms may show a higher (not just equal) rate of innovation than established ones (Katila and Shane, 2005). The team-level focus of the present article, and the contingencies it proposes, may add further detail to the large vs. small debate in innovation on the organizational level of analysis. Adding up these contingencies on various levels may eventually lead to a much-needed unifying theory of the role of financial resources in innovation management at large.

Finally, the contingency framework we propose also contributes to the operations research literature (e.g., Blau et al., 2004; Kolisch et al., 1995; Loch and Kavadias, 2002; Vairaktarakis, 2003). Our explicit focus on financially constrained situations widens the scope of operations research, which traditionally has concentrated on how to 'optimally' allocate financial resources across individual projects. However, in view of the contingencies detailed above, 'optimal' financial resource levels likely vary across teams. The contingency framework we present helps detail the notion of optimal financial resource allocation, where 'optimal' implies 'with respect to the team characteristics at hand'. Counter-intuitively, optimal allocation of financial resources may sometimes mean making less, rather than more financial resources available.

Considering this multi-project perspective and the aim of optimal financial resource allocation raises the question of when does less become 'too little'. Against the background of our conceptual model, we can say with some certainty that there is no generic formula for determining an optimal financial resource level. Instead, it depends on the team-level characteristics we detail above. By the same token, we can say with some certainty that there are limits with regard to how far the moderators can be 'stretched' and the financial constraints become insurmountable. Limited prior research on the effect of top management support (e.g., R&D budget, R&D headcount) on new product profitability seems to indicate such a curvilinear association (Ernst, 2001). However, where exactly the optimum lies and how it can be determined is an issue for further research. We hope that the conceptual model and the underlying relationships we propose will provide some leads for this important work.

Another possible question for further research regards the provenance of the financial resource constraints. In particular, our conceptual model takes financial resource constraints as a given, and does not investigate whether these financial resource constraints can be attributed to external or internal causes. External causes would include radical changes in the industry or environment in which the firm operates, such as deregulation of an industry (e.g., railroad, air travel, banking), aggressive pricing behavior by competitors, or a general economic downturn, all of which are potential causes of organizational decline (e.g., Mone et al., 1998). Internal causes, by contrast, are not associated with organizational decline and instead represent managerial control mechanisms to channel financial resources to individual team projects (Blau et al., 2004; Kolisch et al., 1995; Loch and Kavadias, 2002; Vairaktarakis, 2003). The issue with internal causes is one of plausibility. That is, if financial resources are 'artificially' constrained by management (despite, e.g., good profits and cash flows),



team members may develop negative reactions, driving them to 'fight' for more resources, rather than focusing on their project task. External causes, by contrast, may actually increase the feeling of 'being in this together' and may, as a result, increase motivation and the readiness to use, or learn, the bounded creativity approaches we consider a critical success factor under financial resource constraints. By the same token, though, the related literature on goal setting emphasizes that goals need to be specific and challenging, and that these qualities matter much more than whether the goal is self-set or externally provided (Latham, 2004). Since challenging goals typically are challenging in large part because they exceed what has previously been achieved on certain financial resource endowments, this literature may suggest that it is not clear whether internal vs. external causes for resource constraints have differential effects, which in turn points to further work.

In conclusion, our framework can serve as a starting point for further empirical and theoretical work on how teams innovate under financial resource constraints. In an attempt to make a first step towards a theory of financial resources in innovation projects, we ground the framework theoretically in various literatures to offer propositions regarding contingency factors that explain innovation project performance under financial resource constraints. Future work based on these propositions will contribute to our understanding of the relationship between financial resources and innovation, and may eventually point to strategies that not only focus on doing away with, but instead take advantage of a pervasive phenomenon considered by many an innovation hindrance, namely financial resource constraints.

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