It’s not for the money; it’s the motives – The mediating role of endogenous motivations on IT employees’ entrepreneurial behavior

Completed Research Paper

Henning Krüp
Georg-August-University Göttingen
Chair of Information Management
Platz der Göttinger Sieben 5,
37073 Göttingen, Germany
hkruep@uni-goettingen.de

Johann Kranz
Georg-August-University Göttingen
Chair of Management Information Systems and Methods
Platz der Göttinger Sieben 5,
37073 Göttingen, Germany
jkranz@uni-goettingen.de

Lutz Kolbe
Georg-August-University Göttingen
Chair of Information Management
Platz der Göttinger Sieben 5,
37073 Göttingen, Germany
lkolbe@uni-goettingen.de

Abstract

The traditional task of IT departments is currently undergoing a fundamental change from being a functional part of business, to playing a more strategic role in the development of new products (Bharadwaj 2013). The success of this shift is based on the individual employee’s willingness to go along with this new approach. But how can we influence employees’ individual entrepreneurial motivation and encourage them to develop new features? To answer this question we applied self-determination theory and different process constructs to build a model that explains how the workplace must be designed to encourage employees to work more innovatively. We collected a sample of 354 questionnaires to evaluate our model. The results indicate that job-design constraints in combination with the internal perceived locus of causality (PLOC) provide a starting point for managers to reshape their IT departments. This paper provides the necessary insights to overcome this new challenge.

Keywords: IT innovation, SDT, Goal-setting theory, IT ambidexterity
Introduction

The role of enterprise information technology (IT) is undergoing a fundamental shift (Westermann et al. 2014). Initially, IT was a functional part of the business, employed to automate and streamline processes and to make information readily available across the organization. Starting in the 2000s, IT’s potential as a source of innovation has been recognized (Sambamurthy et al. 2003; Wheeler 2002). Digital technologies – understood as an assortment of information, computing, communication, and connectivity technologies – are becoming increasingly powerful, small, and efficient. Today, their impacts on customer relationships, internal processes, and value propositions are more substantial than ever before as they affect many traditional industries such as manufacturing, energy, automobile, healthcare, or finance (Capgimini 2011; Agarwal et al. 2010; Wunderlich et al. 2013). Digital technologies are not just used to transform core processes and enable new services, but beyond that they are embedded in physical goods to make them “smarter” and uniquely identifiable via the Internet (Nambisan et. al. 2014; Yoo et al. 2010). In the energy sector, for example, sensor and actuator networks are integrated with a physical grid infrastructure – so-called cyber physical systems – to enable predictive maintenance and improve grid management. Researchers such as Nambisan et al. (2014) state that there is an “unexplored role for IT as an operator resource” in innovation. For new innovations to prosper, it is important to understand these opportunities that originated from new IT technologies and services (See 2004). The rapid growth of new IT services and the fast development of hardware components require more research in this field of expertise on how to motivate employees to embrace new possibilities and thus place more value on the core business structures.

This digital transformation is forcing firms to create new IT capabilities and add innovative technological features and services around their core products (Bharadwaj 2013; Rai et al. 2012; Ray et al. 2005; Sambamurthy et al. 2003). Yoo et al. (2010) argue that the effects of digital innovations will have profound consequences on “a firm’s organizing logic and innovation” similar to the impact of modularity on industrial organization (Baldwin and Clark 2000; Langlois 2003). The technological discontinuities caused by digital technologies can create opportunities for firms that are capable of transforming their businesses to gain a competitive advantage while threatening those that are not. In order to belong to the group of firms that can combine IT and business knowledge to create process, product, and service innovations, a deep understanding of the opportunities originating from digital technologies is fundamental. Executives observing how fast digital technologies have disrupted some industries are increasingly realizing that the focus of enterprise IT – and consequently IT workers – has to be extended from supporting the day-to-day business towards shaping businesses in the sense of transforming established and developing innovation (Kahn and Sikes 2014; Guillemette and Paré 2012). They recognize that, apart from increasing productivity, enterprise IT is becoming increasingly crucial for creating and capturing the core value of business making; it becomes an indispensable part of a successful business strategy (Kohli and Grover 2008, Watts and Henderson 2006, Bharadwaj et al. 2013). If companies want to remain competitive in the upcoming years, it is imperative that they not miss this digital transformation of their products. The call for papers in the special issue on “Information Technology and Innovation” of the MISQ (2014) underlines once more the relevance of this topic (Nambisan et al. 2014).

The shifting role of enterprise IT requires more transformational leadership styles that enable and motivate entrepreneurial behavior among IT employees (Leidner et al. 2010; Watts and Henderson 2006). Furthermore, the working environment must create more favorable conditions that allow for experimenting with new ideas and acquiring new knowledge (Floyd and Lane 2000). However, as important as it certainly is, a corporate environment that fosters IT entrepreneurship and beneficial job characteristics can only lay the foundation for changing employee attitudes towards generating innovations. Therefore, more importantly, the general attitudes, abilities, and behaviors of non-managerial IT workers must adapt to the new requirements. Recent research on corporate entrepreneurship supports the view that the origin of innovation resides in the “machine rooms” of organizations, more specifically employees at the operational level (Kuratko and Audresch 2009). The effectiveness of initiating an entrepreneurial orientation in a top-down fashion often overlooks the possibility that entrepreneurial initiatives emerge autonomously from the bottom (Lumpkin et al. 2009). In this respect, research has found that individuals who perceive their behavior as autonomously driven are more motivated than those perceiving their actions as controlled (Deci and Ryan 2002). For this reason, we argue that understanding how extrinsic motivations by either explicit or implicit incentives
provided by management influence IT employees’ endogenous motivations is the key to managing the transition towards a more innovation-centric enterprise IT that motivates IT employees. However, there is a gap in the literature in relation to understanding how top-down–induced extrinsic motivations to foster entrepreneurship influence individual motivations (Wales et al. 2011); our paper addresses this gap. More specifically, we investigate how organizational levers influence employees’ endogenous motivations to engage in entrepreneurial activities (e.g., acquisition of knowledge, developing and experimenting with new ideas) and to what extent those activities are mediated by endogenous motivations. Following Deci and Ryan (2000), our study conceptualizes behavior as being primarily driven by the level of individual autonomy that is the extent to which the behavior is in accordance with self-endorsed values, objectives, and needs. Thus, our study goes beyond the dichotomy of extrinsic versus intrinsic motivation, which overlooks the “independent, mutually reinforcing, or countervailing effects of various motivations” (Malhotra et al. 2008).

To address our research question, we developed a comprehensive model drawing from organizational and social psychology research. To test the hypothesized relationships, we collected data from a large-scale online survey. The results will contribute to IS research in three significant ways: First, the study will provide a more fine-grained understanding of which organizational levers are effective in encouraging IT employees’ entrepreneurial behavior. Second, it offers insights into the under-researched relationship between IT management and entrepreneurship (Del Giudice and Straub 2011). Third, the findings will help IT executives and middle managers shift enterprise IT’s emphasis towards creating innovations.

The paper is organized as follows: We first present the theoretical foundation and draw our research model. We then outline the research methodology and our results. The paper concludes with a discussion of the key results, implications of our findings, and directions for future research.

**Contextual Background**

Today’s ever-increasing global competition requires firms to be constantly innovative in order to sustain or gain competitive advantages. Consequently, many firms try to nurture corporate entrepreneurship as it is consistently found to positively influence a firm’s innovation performance (Burgelman 1983; Covin and Sievin 1991). Corporate entrepreneurship is also an increasingly prominent topic in innovation and management research (e.g., Edelman et al. 2010; Carsrud and Brännback 2011; Habtay 2012). While one can find many terms referring to the phenomenon of corporate entrepreneurship (Garret and Neubaum 2013) and further various definitions (e.g., Burgelman, 1983; Guth and Ginsberg 1990; Schendel 1990; Zahra 1995 and 1997; Chung and Gibbons 1997), we refer to corporate entrepreneurship (CE) as “an organizational process for transforming individual ideas into collective actions through the management of uncertainties” (Chung and Gibbons 1997).

The influence of new IT/ICT on entrepreneurship has already been studied by Vu (2004). Based on data from the 1990s, he found that IT development, e.g., the opportunities provided by smaller controllers, created an entrepreneurial culture within firms while also driving productivity gains. This impact has also been confirmed in many different countries by numerous researchers (Armstrong et al. 2002; Jalava and Pohjola 2001; Kim 2002; Oulton 2002; Parham et al. 2001; Van der Wiel 2001). Based on these former developments and insights, Del Giudice and Straub (2011) pursue this line of research even further and ask, “[...] how does IT contribute value to entrepreneurial ventures?”. The impact of IT on entrepreneurial ventures (Chesbrough 2003; Nambisan and Sawhney 2007; Ma and Wang 2006) can occur in two different forms. On the one hand, IT offers the possibility of creating an environment that enhances innovation processes. IT not only opens the field for future innovations by involving a global network of partners, customers, and other stakeholders, but also enables deeper customer-client relationships and enhances collaboration on an international level. For the phenomenon of open innovation, for instance, the inclusion of global networks, partners, customers, and other stakeholders into the firm’s innovation process is facilitated by IT which support and stimulate inter-firm collaborations (Nambisan et al. 2014). The development of new information technologies, on the other hand, creates entrepreneurial opportunities. This increases the significance of IT with regard to a company’s core product and services and thus the relevance of IT for innovation (Yoo et al. 2010). In this context organizational ambidexterity understood as “an organization’s ability to be aligned and efficient in its management of today’s business
demands while simultaneously being adaptive to changes in the environment” (Raisch and Birkinshaw, 2008) is of special importance (e.g., Im and Rai 2008; March 1991; Raisch et al. 2009). Traditionally, the focus of IT departments was incrementally refining organizational processes and products (exploitation). IT departments were not expected to be drivers of innovation. Today, IT departments face the challenge pursue both exploitative and explorative (e.g., developing new ideas, experimenting with innovative technologies) activities. This shift is a major change for most IT departments. Whereas exploitative tasks need structure and efficiency, exploration requires creativity and autonomy. Thus, management of IT departments has to adapt its leadership style and to give employees more freedom to experiment and incentives as well to behave entrepreneurially.

Research in the field of entrepreneurship has studied the important role of motivations. Regarding the intrinsic motivation research has focused on aspects such as prestige through exploiting an opportunity (Reynolds et al. 2002) or the drive to create your own business. Entrepreneurs are often highly motivated to create an ‘ideal’ firm they would like to work for. These influencing factors have been researched thoroughly in the field of management but have thus far been neglected in the field of entrepreneurship (e.g., Quigley and Tymon 2006). The extrinsic motivation refers to incentives such as money, power and other economic factors, given for entrepreneurial behavior. Entrepreneurs being extrinsically motivated believe their actions lead to rewards (Perwin, 2003; Schumpeter 1934). The personal profit is often a motivation for these entrepreneurs as they want to achieve wealth and status (Elfving 2009). Prior research assume that entrepreneurial actions “are motivated by external rewards” (Alan Carsrud and Malin Brännback 2011). Employees can be motivated by both intrinsic and extrinsic motivation, so it is not an either-or choice. Nevertheless, despite what type of goal an entrepreneur pursues, a key factor to becoming an entrepreneur is motivation (Edelman et al. 2010).

Hypotheses Development

In the following we develop our research model (see Figure 1.) and derive our hypotheses.

![Research Model Diagram]

**Figure 1. Research Model**
Contextual Motivations

As we study the phenomenon of ‘if and how’ organizations can improve the innovativeness of IT employees, we think that Self-Determination Theory (SDT) (Deci and Ryan 1985) is particularly suited. SDT provides a framework to study the impact of social and cultural factors on individuals’ sense of volition which eventually determines behavior. According to SDT, an individual’s perception of autonomy will increase her/his motivation to behave like an ‘in-house entrepreneur’ thus enhancing performance, persistence, and creativity. As this study particularly addresses the question if and how IT employee’s entrepreneurial behavior can be fostered by organizations, the focus of our study is on different subtypes of extrinsic motivation.

Prior research in IS and CE has treated motivation primarily as exogenous, meaning that human behavior is perceived as triggered by either extrinsic or intrinsic motivation. In contrast, self-determination theory (SDT) claims that motivation is endogenous as individuals initiate all behaviors (Ryan and Deci 2000; Skinner 1953). SDT considers behavior as not being motivated by external stimuli but rather by the subjective psychological meanings of these stimuli. This perspective treats behavior as an act of individual volition that may even be undermined by extrinsic rewards, rather than as a result of expected rewards (Curry et al. 1991; Deci 1971; Dholakia 2006; Frey and Oberholzer-Gee 1997; Pritchard et al. 1977).

In predicting individual behavior, the type of motivation – autonomous versus controlled motivation – was found to be more important than the amount of motivation (Deci and Ryan 2000; Ryan and Deci 2000; Malhotra et al. 2008; Wunderlich et al. 2013). Individuals who perceive their actions as autonomously driven experience a sense of choice, whereas those whose behaviors are linked to feelings of pressure and coercion originating from external sources perceive themselves as being controlled. We expect that working conditions that support individuals’ feeling of autonomy regarding entrepreneurship foster their creativity, engagement for activities and enhance their performance in the area of innovation.

In understanding the influence of the perceived degree of self-determination on behavior, the Organismic Integration Theory (OIT), a sub-theory of SDT, has proved to be valuable in a number of scientific areas (Cadwallader et al. 2010; Deci and Ryan 2002). OIT conceptualizes individually experienced levels of autonomy as existing along a continuum of motivation (see Figure 2), referred to as the perceived locus of causality (PLOC), which is the degree to which an individual experiences behavior as initiated and endorsed by the self (Ryan and Connell 1989). The degree to which individuals appropriate and internalize external influences determines the perceived locus of causality, ranging from internal to internal regulation. Regulation refers to an internalized principle or value (e.g., an individual sense of autonomy) that controls behavior (Cadwallader et al. 2010; Wunderlich et al. 2013). The more a value is appropriated and internalized, the more the regulation is perceived as autonomous. Hence, external regulation describes controlled forms of behavior that are performed because of external influences or pressures. In contrast, internal regulation implies that people perceive themselves as the origin of their behavior. That is, they experience the behavior as more self-determined, reflecting a higher degree of internalization. Thus, the continuum ranges from two relatively autonomous forms of motivation (i.e., intrinsic and identified regulation) to two relatively controlled forms of motivation (i.e., external and introjected regulation) (Ryan and Connell 1989).

Internal PLOC

Internal PLOC refers to a high degree of internalization of extrinsic motivations such as goals or incentives. This means that external regulations have become personally meaningful to individuals and perceive their behavior as autonomously motivated (Ryan and Connell 1989). Sheldon (2002) also stated that under the influence of internal PLOC individuals feel congruent with their psychological needs. For our research, we assume that when individuals perceive their entrepreneurial behavior as autonomously driven, their intention to try new things, gather and combine new knowledge will increase. Prior research suggests that individuals who are autonomously motivated in congruence with personal goals and values are more motivated to overcome obstacles (Csikszentmihalyi 1990). Therefore, we assume that the intention to invest time and effort in unsecure and demanding innovation projects, is higher if people have fully internalized extrinsic motivations (Agarwal and Karahanna 2000; Deci 1975). Therefore, we propose:
H1a: Internal PLOC positively influences individual entrepreneurial intention.

External PLOC

Individuals performing behavior under the influence of external PLOC is perceive their behavior as externally coerced. Thus, external PLOC is the least autonomous form of extrinsic motivation. Individuals then perceive their behavior as a result of external authorities or compliance (Ryan and Connell 1989). However, although individuals perceive behavior as driven by extrinsic motivations such as financial rewards or social appreciation, these motivations may ultimately lead to individuals engaging in entrepreneurial activities. Thus, employees may still try to be more innovative because of external stimuli which are important to them. Therefore, we propose:

H1b: External PLOC positively influences individual entrepreneurial intention.

Job Constraints

According to goal-setting theory tasks must be both realistic and complex to increase the goal achievement of employees (Locke and Latham 2002, 2006). Tasks must also provide the five main principles of clarity, challenge, commitment, feedback, and task complexity. Loock et al. (2013) additionally proposes to ‘free choice of time’ which we assume to be of particular importance for employees having time to gather new external knowledge and experiment with new ideas. Therefore, we include job variety as a construct in our model. As our research focuses on innovations, we did not consider the principal of clarity, as exploring is an inherently unstructured process. To reflect the principles of challenge and complexity, we incorporate task variety as a construct in our research model as it measures the degree to which employees are confronted with new and varied tasks on a regular basis.

Innovative companies such as Google or 3M have demonstrated that if a job offers high task variety, the employees gather experiences in different domains which increases their ability to solve complex problems. Combined with the freedoms provided by job autonomy, employees are able to engage in innovative activities. Hornsby et al. (1993, 2002) concretize the relationship between job autonomy and individual entrepreneurial intention and argue that job autonomy is one of the core constructs for creating a suitable climate for corporate entrepreneurship. Prior research has shown that job autonomy positively affects firm-level CE and the number of ideas actually implemented by managers (Hornsby et al. 2009, Ling et al., 2008). We expect that job autonomy, as part of job enrichment (Hackman and Oldham 1980), enhances employees’ motivation to undertake innovative activities. Google, as one of the currently leading companies in innovation, began the “20% time” program in 2004, allowing employees to take one day a week to work on their own projects. This resulted in successful innovations such as Google AdWords. As these innovative activities involve trial and error, autonomy and freedom are essential to be innovative even in the face of failure (Ramamoorthy et al. 2005). Generating innovations requires to increase employees’ job autonomy by reducing regulations, bureaucracy, and rules as far as possible (Herriott et al. 1997). Therefore, we expect job autonomy to be positively related to the extent to which an employee is motivated by internal. We also assume that the effect of job autonomy is at least partially mediated by internal PLOC. Therefore, we propose:

H2a: Job autonomy positively influences the internal PLOC.
H2b: Job autonomy negatively influences the external PLOC.

H2c. Internal PLOC at least partially mediates the positive effects of job autonomy on the individual entrepreneurial intention.

H2d: External PLOC at least partially mediates the positive effects of job autonomy on the individual entrepreneurial intention.

Kanter (1988) argues that employees can feel “crippled” when there is little task variety, a feeling that is associated with little challenge and meaning of the job to employees. This has also been confirmed by other researchers, who state that a routine job decreases the motivation of employees (Mueller et al. 1994). Conversely, this means that variety in carrying out a job is positively related to an employee’s endogenous motivation regarding CE. Different tasks as part of the job are helpful in providing a more
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enjoyable and interesting job. Further, employees gather experiences and knowledge in diverse domains, which is regarded as an important antecedent of innovation to emerge. Within groups, a climate more conducive to innovation is established if the group faces more complex tasks and greater task variety (Antoni 2005). On the individual level we also expect that greater task variety will lead to employees be more motivated through internalized goals (internal PLOC) Therefore, we state:

H3a: Task variety positively influences the internal PLOC.
H3b: Task variety positively influences the external PLOC.
H3c: Internal PLOC at least partially mediates the positive effects of Task variety on the individual entrepreneurial intention.
H3d: External PLOC at least partially mediates the positive effects of Task variety on the individual entrepreneurial intention.

Corporate Environment

Goal-setting theory contends that feedback and commitment are important elements with regard to motivation. We include those two principles by incorporating management support and rewards and reinforcements in our model.

The motivation of employees to innovate and individual entrepreneurial intention are linked to management support (e.g., Stevenson and Gumpert 1985; Katz and Gartner 1988). A lack of management support leads to a higher risk awareness of employees. This inhibits employees from being innovative and reduces motivation because employees fear “being victimized if the innovation attempt fail[s]” (Manimala et al. 2005). On the other hand, if management supports innovation and tolerates failures, this generates an environment in which entrepreneurial thinking and action of employees is encouraged. Although innovative activities are associated with a high risk of failure, employees have to be assured that they are granted with adequate resources by management (Katz and Gartner 1988).

Prior research has focused on top-level management support. Top management support is defined as “as the corporate parent’s senior-level executives’ support of and commitment to the ICVs [internal corporate venture] success” (Gerret et al. 2013). Management support not only comprises supporting employees with organizational and financial resources, but moreover that senior managers champion these new ventures (Greene et al. 1999). As we study entrepreneurship on the individual level, we believe that middle managers in direct contact with IT workers play a crucial role for enhancing or decreasing employees’ motivations to be innovative. Since, most senior managers are locked in their conventional business with fix-defined products, middle managers and their teams are found to be the origin for discovering and implementing innovations (Kuratko and Audretsch 2009; Yu and Hang 2010). Thus, we propose that middle manager’s support of corporate entrepreneurship has a positive influence on employee’s internal and external PLOC. Therefore, we state:

H4a: Management support positively influences the internal PLOC.
H4b: Management support positively influences the external PLOC.
H4c: Internal PLOC at least partially mediates the positive effects of management support on individual entrepreneurial intention.
H4d: External PLOC at least partially mediates the positive effects of management support on individual entrepreneurial intention.

Apart from management support, research suggests that rewards and reinforcements are major extrinsic motivations. Rewards are often granted for outstanding work performance, e.g., new product innovations. These could be higher salaries, job security, or any other kind of promotions and are found to motivate employees (Brickley et al. 2000). However, extrinsic rewards can have a negative impact on an employee’s intrinsic motivation. Intrinsically motivated individuals can find themselves feeling controlled by these
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rewards. Prior research called this phenomenon motivation crowding out (Frey and Oberholzener-Gee 1997; Frey and Jegen 2001). It causes a shift in the perceived locus of causality from internal to external (Deci and Ryan 2000; Lepper et al. 1973). We assume that, as a result, the intrinsic motivation of an employee decreases, thereby reducing creativity and performance. In contrast, if managers provide autonomy as well as support and recognition, the performance of intrinsically motivated employees will improve (de Charms 1968). Thus, if balanced appropriately, rewards and reinforcements should to be positively associated to internal PLOC to a moderate extent and to a higher extent to external PLOC. Therefore, we propose:

H5a: Rewards and reinforcements positively influence the internal PLOC.

H5b: Rewards and reinforcements positively influence the external PLOC.

H5c: Internal PLOC at least partially mediates the positive effects of rewards and reinforcements on individual entrepreneurial intention.

H5d: External PLOC at least partially mediates the positive effects of rewards and reinforcements on individual entrepreneurial intention.

Research Design and Method

Data-Collection Procedure and Sample

To test our research model, we collected data from an online survey conducted in February 2014. We collaborated with a market research company hosting a panel of employees currently working in an IT department of non-IT firms in Germany and the UK. Our survey was developed in English and translated into German by an independent translator, then translated back by another translator to establish conceptual consistency. Of the initial sample of 526 participants that took part in the study, 71% completed the survey (n = 372). From those, 18 with an implausibly short handling time were removed. The sample’s demographics are provided in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Demographics of Participants</th>
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<tbody>
<tr>
<td>Total Sample</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>19–25</td>
</tr>
<tr>
<td>26–35</td>
</tr>
<tr>
<td>36–45</td>
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<tr>
<td>46–55</td>
</tr>
<tr>
<td>56–65</td>
</tr>
<tr>
<td>66 and over</td>
</tr>
<tr>
<td><strong>Management</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td><strong>Working Experience</strong></td>
</tr>
<tr>
<td>&lt; 2 years</td>
</tr>
<tr>
<td>3–5 years</td>
</tr>
<tr>
<td>6–10 years</td>
</tr>
<tr>
<td>11–15 years</td>
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</table>
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<table>
<thead>
<tr>
<th>Company size</th>
<th>16–20 years</th>
<th>&gt; 20 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>42</td>
<td>12%</td>
</tr>
<tr>
<td>50–99</td>
<td>39</td>
<td>11%</td>
</tr>
<tr>
<td>100–499</td>
<td>86</td>
<td>24%</td>
</tr>
<tr>
<td>500–999</td>
<td>75</td>
<td>21%</td>
</tr>
<tr>
<td>1.000–2.499</td>
<td>46</td>
<td>13%</td>
</tr>
<tr>
<td>2.500–9.999</td>
<td>33</td>
<td>9%</td>
</tr>
<tr>
<td>&gt;10.000</td>
<td>33</td>
<td>9%</td>
</tr>
</tbody>
</table>

Measurement of Constructs

We followed standard psychometric scale development procedures. All items were assessed on a seven-point Likert-type rating scale with the anchors “strongly disagree” (1) and “strongly agree” (7). We used validated scales when possible and adapted some for the context of our study. In a first step, the items were evaluated by scholars in the areas of corporate entrepreneurship and motivation research and IT practitioners. Based on their assessments, some items were reworded to achieve face and content validity of the scales (Hardesty and Bearden 2004; Moore and Benbasat 1991). In addition, we conducted two pilot studies (n = 23) to evaluate and refine our reflective measures. The reliabilities of the scales for the second pilot study indicated that they were appropriate for use in a larger study (Brown and Venkatesh 2005). The final items of the latent variables and the psychometric properties are presented in Table 2.

<table>
<thead>
<tr>
<th>Construct (Source)</th>
<th>Items</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job autonomy</td>
<td>My work gives me a chance to use my personal initiative or judgment in carrying out the work.</td>
<td>.892***</td>
</tr>
<tr>
<td></td>
<td>My work allows me to make a lot of decisions on my own.</td>
<td>.923***</td>
</tr>
<tr>
<td></td>
<td>My work provides me with significant autonomy in making decisions.</td>
<td>.916***</td>
</tr>
<tr>
<td>Task variety</td>
<td>My work involves a great deal of task variety.</td>
<td>.897***</td>
</tr>
<tr>
<td></td>
<td>My work concerns a wide array of responsibilities.</td>
<td>.911***</td>
</tr>
<tr>
<td></td>
<td>My work involves doing a number of different things.</td>
<td>.895***</td>
</tr>
<tr>
<td>Management support</td>
<td>People are often encouraged to take calculated risks with ideas around here.</td>
<td>.856***</td>
</tr>
<tr>
<td></td>
<td>This business unit supports many small and experimental projects, realizing that some will undoubtedly fail.</td>
<td>.859***</td>
</tr>
<tr>
<td></td>
<td>Senior managers encourage innovators to bend rules and rigid procedures in order to keep promising ideas on track.</td>
<td>.822***</td>
</tr>
<tr>
<td></td>
<td>Those employees who come up with innovative ideas on their own often receive management encouragement for their activities.</td>
<td>.844***</td>
</tr>
<tr>
<td></td>
<td>Money is often available to get new ideas off the ground.</td>
<td>.830***</td>
</tr>
<tr>
<td>Rewards/reinforcement</td>
<td>My supervisor will give me special recognition if my work performance is especially good.</td>
<td>.945***</td>
</tr>
<tr>
<td></td>
<td>My manager will tell his/her boss if my work was outstanding.</td>
<td>.934***</td>
</tr>
<tr>
<td>External PLOC</td>
<td>I contribute to the development and implementation of innovative ideas because it is financially attractive to me.</td>
<td>.785</td>
</tr>
<tr>
<td></td>
<td>I contribute to the development and implementation of innovative ideas because others think I should do that.</td>
<td>.839***</td>
</tr>
<tr>
<td></td>
<td>I contribute to the development and implementation of innovative ideas so that colleagues or supervisors don’t have to motivate me to do so.</td>
<td>.786***</td>
</tr>
</tbody>
</table>
Analysis and Results

The research model was validated using structural equation modeling. We applied the component-based partial least square (PLS) approach using SmartPLS version 2.0.M3 (Ringle et al. 2005). Following the two-stage procedure proposed by Anderson and Gerbing (1988), we first assessed the psychometric properties of the measurement model and subsequently tested the hypotheses with the structural model.

Assessment of Measurement Model

To assess the reflective variables, we conducted reliability and validity tests according to the guidelines of Gefen and Straub (2005). As illustrated in Table 2, all but three reflective items loaded significantly on the underlying constructs with values well above the recommended threshold of .707 (Chin 1998) and none of the items loaded on their construct below the cutoff value of .50. Composite reliability (CR) scores also exceeded the recommended threshold of .70 (Gefen and Straub 2005) (see Table 3). Furthermore, we conducted a confirmatory factor analysis to check cross-loadings. All indicator items loaded significantly more on their corresponding construct than on any other construct. Hence, the tests imply that indicator and construct reliability were satisfactory. Convergent validity was assessed by examining the constructs’ average variance extracted (AVE). The results indicate that the AVE of each construct was well above the common threshold of .50 (Bhattacherjee and Premkumar 2004). To establish discriminant validity, the criterion of Fornell and Larcker (1981) was applied. As the squared correlations between any two constructs are lower than the corresponding AVE, discriminant validity was also established.
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Table 3. Construct Correlations

<table>
<thead>
<tr>
<th>Construct</th>
<th>Range</th>
<th>Mean (STD)</th>
<th>CR</th>
<th>AVE</th>
<th>CA</th>
<th>IEI</th>
<th>EPLOC</th>
<th>IPLOC</th>
<th>JA</th>
<th>TV</th>
<th>MS</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEI</td>
<td>1–7</td>
<td>5.32 (0.95)</td>
<td>.91</td>
<td>.62</td>
<td>.88</td>
<td>.79</td>
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<tr>
<td>EPLOC</td>
<td>1–7</td>
<td>4.81 (1.04)</td>
<td>.89</td>
<td>.61</td>
<td>.85</td>
<td>.56</td>
<td>.78</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IPLOC</td>
<td>1–7</td>
<td>5.49 (0.84)</td>
<td>.92</td>
<td>.69</td>
<td>.89</td>
<td>.76</td>
<td>.56</td>
<td>.83</td>
<td></td>
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<tr>
<td>JA</td>
<td>1–7</td>
<td>5.48 (0.93)</td>
<td>.94</td>
<td>.83</td>
<td>.90</td>
<td>.66</td>
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<td>.70</td>
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<td></td>
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<tr>
<td>TV</td>
<td>1–7</td>
<td>5.44 (0.91)</td>
<td>.93</td>
<td>.81</td>
<td>.88</td>
<td>.62</td>
<td>.47</td>
<td>.69</td>
<td>.78</td>
<td>.90</td>
<td></td>
<td></td>
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<tr>
<td>MS</td>
<td>1–7</td>
<td>4.93 (0.97)</td>
<td>.92</td>
<td>.71</td>
<td>.90</td>
<td>.56</td>
<td>.62</td>
<td>.50</td>
<td>.59</td>
<td>.51</td>
<td>.84</td>
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<tr>
<td>RR</td>
<td>1–7</td>
<td>5.31 (1.03)</td>
<td>.94</td>
<td>.88</td>
<td>.87</td>
<td>.49</td>
<td>.44</td>
<td>.50</td>
<td>.57</td>
<td>.50</td>
<td>.64</td>
<td>.94</td>
</tr>
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</table>

Note: STD: standard deviation; CR: composite reliability; AVE: average variance extracted; CA: Cronbach Alpha; IEI = individual entrepreneurial intention; EPLOC = external PLOC; IPLOC = internal PLOC; JA = job autonomy; TV = task variety; MS = management support; RR = rewards and reinforcements; bold diagonal elements represent the square-root of AVE.

Testing the Structural Model

The research model was validated using structural equation modeling. The significance of the parameter estimates was calculated applying bootstrapping with 3,000 samples. Figure 2 shows that the hypothesized direct effects of the endogenous motivations were supported (H1a, H1b). The results also confirmed the positive effects of job design constraints on employee motivation. We could not confirm the positive effects of management support and rewards and reinforcements on motivation towards the individual entrepreneurial intention. Only management was statistically significant as an influencing factor.

Based on the model estimations, our hypotheses H1a (β = .65, p > .001) and H1b (β = .189, p > .001) were confirmed. Therefore, we can state that both the internal and the external PLOC positively influence the individual entrepreneurial intention of IT department employees.

For the effect of the job design constraints on the employees’ PLOCs we can state that the job autonomy has a significant positive effect on the internal PLOC but no significant effect could be shown on the external PLOC. Hence, we find support for H2a (β = .336, p > .001) but not for H2b (β = .152, n.s.).

Task variety as the second job design constraint performs in a similar way as the autonomy. We found a significant positive effect on the internal PLOC while no effect could be found for the external PLOC. Thus we find support for H3a (β = .357, p > .001) and similar to the job autonomy no support for H3b (β = .011, n.s.).

For the corporate environment we used two constructs that are suitable for our study. In contrast to job design constraints, management support, as part of the corporate environment, has a significant, positive effect on the external PLOC and no effect on the internal PLOC. As a result, H4b (β = .490, p > .001) is supported, while H4a (β = .053, n.s.) finds no support by our measurement.

The statistically significant influence of rewards and reinforcements as a construct of the corporate environment on the contextual motivations was not supported by our data. Therefore, we state that H5a (β = .096, p > n.s.) and H5b (β = -.016, n.s.) are not supported. Figure 2 illustrates the model and the results of the hypotheses testing.
We also tested for common method bias because the independent and dependent variables were provided by the same respondent. Both the Harman’s single-factor test (Podsakoff et al. 2003) and the marker variable test (Lindell and Whitney 2001) indicate that common method bias was not a threat to the validity of our study.

**Mediation Analyses**

For testing our hypothesized mediating role of the external and internal PLOC, we followed the procedures of Baron and Kenny (1986). The following conditions must be fulfilled to verify the mediating effect. First, without checking with the mediator, the independent variable (IV) must account for variations in the depended variable (path c). Second, there must be a significant variation in the mediator to the depended variable (path b). Third, there must be a significant variation in the IV to the mediator (path b). If these conditions are fulfilled and the effects of the IV on the depended variable decrease while checking for the mediation (path c’) compared to path c, we can state that there is a mediating effect. To determine whether this is a full or partial mediation, we must check whether path c’ is significant. If path c’ is still significant, it is a partial mediation; if path c’ is statistically insignificant, it is a full mediation. (Baron and Kenny 1986).

The significance of the mediation can be examined with the Sobel test (Sobel 1982). This test of indirect effects checks whether the IV’s effect decreases after inserting the mediator into the model. Our results are presented in Table 4. We can state that both the internal and the external PLOCs partially mediate the job design constraints and the corporate environment.
Our study focuses on an important gap regarding the role of endogenous motivation on employees’ individual entrepreneurial intention. To prepare IT managers for the future challenge of an IT department that is increasingly concerned with innovative and explorative tasks, it is important to understand the factors that influence individual entrepreneurial intention. In our study we created a model analyzing the roles of endogenous motivation, job design constraints, and corporate environment and tested them empirically. Our findings should help managers to understand the direct influence of job design constraints and the corporate environment on employees’ endogenous motivation regarding individual entrepreneurial intention.

Our proposed model was tested with 354 employees of IT departments in non-IT firms. We found that endogenous motivation have a major influence on employees’ individual entrepreneurial intention. The results indicate that when extrinsic motivations are fully internalized (internal PLOC) the more motivated employees are to engage in innovative activities. Task variety and job autonomy are key drivers of increasing employees’ motivation regarding entrepreneurship. Our findings show that these job design constraints have the greatest influence on the internal PLOC. Management support and rewards and reinforcements however, were not found to have a significant impact on internal PLOC.

External PLOC is also positively related to entrepreneurial innovation. Although weaker than the effect of internal PLOC, results imply that external PLOC still has a positive effect on individual entrepreneurial intention. We could not find evidence for the impact of job design constraints on the external PLOC. Management support, however, significantly influences the external PLOC. Surprisingly, we could not find any effect of rewards and reinforcements impacting external PLOC.

The results of the mediation analyses (see Table 4) show the important and statistically significant role of endogenous motivations. Both the external and internal PLOCs partially mediate the influence of the corporate environment, management support and rewards and reinforcements, on individual entrepreneurial intention. The internal PLOC also partially mediates the influence of job design constraints, job autonomy and job variety.

The results also have implications for practitioners. In this study we found that if being innovative becomes personally meaningful to employees, they will have a higher individual entrepreneurial intention. IT managers who are concerned with the ambidextrous role of IT and exploration tasks, can build upon our work. Therefore, managers need to provide organizational and financial resources as well as championing the new ventures. To reduce workplace monotony and low task complexity, which is negative related to entrepreneurial actions, managers should offer a high degree of task variety and by that more complex task. To handle these complex tasks and also to work innovative, employees need a high degree of autonomy. The success of Google in innovation shows that giving employees free space and

### Table 4. Mediation Analyses of Entrepreneurial Intention

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>IV</th>
<th>MV</th>
<th>Model I</th>
<th>Model II</th>
<th>Sobel’s Test</th>
<th>Mediation</th>
</tr>
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<tbody>
<tr>
<td>M1</td>
<td>JA</td>
<td>EPLOC</td>
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<td>.305***</td>
<td>.497***</td>
<td>.661***</td>
</tr>
<tr>
<td>M2</td>
<td>JA</td>
<td>IPLOC</td>
<td>.701***</td>
<td>.582***</td>
<td>.251***</td>
<td>.661***</td>
</tr>
<tr>
<td>M3</td>
<td>TV</td>
<td>EPLOC</td>
<td>.487***</td>
<td>.354***</td>
<td>.448***</td>
<td>.628***</td>
</tr>
<tr>
<td>M4</td>
<td>TV</td>
<td>IPLOC</td>
<td>.694***</td>
<td>.630***</td>
<td>.183*</td>
<td>.628***</td>
</tr>
<tr>
<td>M5</td>
<td>MS</td>
<td>EPLOC</td>
<td>.625***</td>
<td>.330***</td>
<td>.370***</td>
<td>.578***</td>
</tr>
<tr>
<td>M6</td>
<td>MS</td>
<td>IPLOC</td>
<td>.499***</td>
<td>.631***</td>
<td>.250***</td>
<td>.578***</td>
</tr>
<tr>
<td>M7</td>
<td>RR</td>
<td>EPLOC</td>
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<td>.440***</td>
<td>.299***</td>
<td>.503***</td>
</tr>
<tr>
<td>M8</td>
<td>RR</td>
<td>IPLOC</td>
<td>.500***</td>
<td>.677***</td>
<td>.162***</td>
<td>.503***</td>
</tr>
</tbody>
</table>

Note: IV = independent variable; Model I: without controlling for the mediator (EI); Model II: with controlling for the mediator; Path a: IV -> mediator; Path b: mediator -> intention; Paths c and c’: IV -> intention; * p < .05; ** p < .01; *** p < .001.

**Discussion and Implications**

Our results imply that external PLOC still has a positive effect on individuals to reduce workplace monotony and low task complexity, which is negative related to entrepreneurial actions, managers should offer a high degree of task variety and by that more complex task. To handle these complex tasks and also to work innovative, employees need a high degree of autonomy. The success of Google in innovation shows that giving employees free space and

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time for innovation motivates employees to develop innovations. This study indicates that firms which aim at increasing corporate entrepreneurship in IT departments should reduce the time and effort IT employees spend on routine, exploitative tasks and increase employees’ exposure to other domains and more exploratory tasks. We demonstrated that autonomous motivation is particularly important for employees intending to behave as in-house entrepreneurs, while less autonomous extrinsic motivations have a weaker effect. Therefore, middle managers should carefully adjust job designs and incentives systems to satisfy the specific need of their employees. Our study shows that the entrepreneurial intention is promoted by employees rather than imposed top-down. If job constraints, job autonomy and task variety, as well as the corporate environment, management support and rewards and reinforcements, are adjusted right, managers can stimulate the entrepreneurial intention of employees but are not able to impose it.

Besides these contributions, some limitations should be considered when interpreting the results. The study was conducted in Western European countries which potentially limits the generalizability of this study with respect to other cultures. Therefore, future research should validate our findings in different cultures. Further research should also focus on extending our model by finding moderating effects on both the PLOCs and individual entrepreneurial intention. Furthermore, we encourage future research to focus on how to transform the individual entrepreneurial intention into corporate entrepreneurial action.

Conclusion

Thus far, entrepreneurial behavior research has not played a significant role in IS research. As the role of IT as a trigger and enabler of innovation is increasing, more research on that topic is needed. Our study provides important insights into the role of endogenous motivation and its mediating effects on the job design constraints and corporate environment relationships included in our research model. As we focused on the special case of IT departments, our results provide new knowledge on how middle managers can create an innovative work environment. The study provides a starting point for research on how to enable digital transformations of businesses.

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