NURTURING THE CREATIVITY POTENTIAL OF ORGANISATIONAL IT

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Recommended Citation
https://aisel.aisnet.org/ecis2019_rp/57
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Research paper

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Abstract

This paper put forth a model studying the creativity-enabling potential in organisational IT. Building on the Componential Theory of Creativity we study how individual level drivers can lead organisation member to generate creative ideas when working with newly implemented IT. We explore two specific drivers, namely IT fluency and IT mastery motivation, and further study organisational and social antecedents of these drivers. These antecedents are IT training, peer-based IT support, organisational learning culture, and IT advocacy. We provide empirical support for our model based on data collected through a cross-sectional survey of working professionals. Our paper offers contribution to research by demonstrating the creativity potential embedded in any organisational IT, and to practitioners by providing insights on tools that can be used to realize this creativity potential.

Keywords: IT-Enabled Idea Generation; Individual Creativity; Componential Theory of Creativity; Survey
1 Introduction

Creativity is the production of original and valuable ideas by individuals, working alone or in small groups (Amabile 1988; Amabile and Pratt 2016). Creativity can be the endeavour of a group or of an individual, and in this paper, we focus on individuals as the source of creative ideas.

Key to creativity is the activity of idea generation by individuals, which IS research has been studying in order to design specialized technologies that can help individuals generate novel and useful ideas (e.g. Althuizen and Reichel 2016; Althuizen and Wierenga 2014; Cheung et al. 2008; Potter and Balthazard 2004; MacCrimmon and Wagner 1994; Marakas and Elam 1997; Massetti 1996; Satzinger et al. 1999; Thatcher and Brown 2010). Extant research on IT and creativity provides important insights with respect to IT’s impact on the generation of ideas. For example, the manner in which information is presented to users can influence the quantity and quality of their ideas (Potter and Balthazard 2004; MacCrimmon and Wagner 1994; Elam and Mead 1990). Similarly, access to knowledge repositories can enhance both the number of quality of ideas (Cheung et al. 2008). Further, a mixture of communication technologies can influence the novelty and usefulness of ideas (Thatcher and Brown 2010). In fact, the mere use of an IT can impact idea generation (Massetti 1996).

It is this latter insight that we focus on and further develop in this paper. Notwithstanding the important insights produced by the above stream of research, its focused attention on creativity-support systems may under-represent IT’s role in enabling creativity by overlooking the capacity of non-specialized technologies to help individuals generate ideas (e.g., Beaudry and Pinsonneault 2005). By non-specialized, we mean organisational IT that are not designed specifically for creativity enhancement, such as CRM, ERP, and DBMS (henceforth, we refer to such technologies simply as IT). Consequently, our understanding of the creativity-enabling role that IT can play is incomplete, and is concentrated on specially-designed creativity support systems.

Furthermore, knowing what organisations can do to support and enhance creativity with IT provides an important tool for managers. The research question addressed in this paper is, therefore: how can IT support creative idea generation in organisations?

To address this question, we develop a model that examines factors supporting IT’s enabling role in individual creativity. Specifically, we explore the personal, organisational, and social factors that shape individuals’ ability to use IT to generate ideas at the workplace. In doing so we offer two important contributions to research and practice. First, our paper demonstrates IT’s ability to support creativity in organisations even when not specifically designed to do so. In other words, we argue that creativity potential is embedded in any IT, simply by enabling users to do things in a different way than has been done so far. Second, we highlight individual level factors that are positively linked to creativity with IT, and the organisational and social drivers that support them. This provides important levers to managers looking to gain more value out of their implemented technologies.

In the next section we briefly discuss the paper’s underlying theoretical foundation. We then develop a model building on this foundation and addressing the above research question. Following the theory development section, the paper presents empirical evidence in support of the proposed model. The paper concludes with a discussion of its key contributions and the avenues it opens for future research.

2 Theoretical Foundations

Empirical IS research on creativity is often conducted within the confines of controlled experiments, thereby excluding potentially explanatory components in employees’ work environment. The componental theory of creativity offers a comprehensive view of the organisational, social, and psychological components influencing creative work (Amabile 2018). The theory explains how individual-level components and components in the work environment, both organisational and social, influence employees’ production of creative ideas (Amabile 1983; Amabile et al. 1996). The theory thus helps to explain differences in creativity across organisational members, and to identify managerial levers for enhancing employee creativity (Amabile 1988, 1997).

The individual-level components that influence creativity include domain-relevant skills, task motivation, and creativity-relevant skills. Domain-relevant skills include employees’ factual knowledge, technical skills, special talents, and expertise, all in the domain in which the employees are
working (Amabile 1983, 1988). Employees can use their expertise, technical skills, and relevant talents to generate possible responses to problems in their domain of work and to judge the viability of those ideas (Amabile 2018).

Task motivation refers to employees’ attitudes toward a task, and self-assessment of their motivation for understanding the task (Amabile 1983). Employees who are self-driven, excited by the work, attracted by the sense of the challenge of the problem, and believe they are working on something important are likely to be highly task motivated (Amabile 1988). This component captures employees’ intrinsic motivation to engage in a work-related activity because they find it interesting, enjoyable, satisfying, or challenging (Amabile and Pillemer 2012).

Creativity-relevant skills encourage creative thought and are often accompanied by tolerance for uncertainty, willingness to experiment and proceed by trial-and-error, and ability to make quick judgments (Amabile 1983, 1988). This component can also involve cognitive processes that promote novel thinking, skills in generating ideas, capacity for independent thought, and willingness to take risks and to view problems from different and new perspectives (Amabile and Pillemer 2012).

The manner in which employees perceive the work environment can also influence the creative work they produce (Amabile et al. 1996). Various components in the work environment, such as the presence of organisational members with complementary knowledge and expertise in the domain and the availability of training on essential subjects, can help individuals produce creative work (Amabile 1988). Individuals’ engagement in creative work is also influenced by the orientation of the organisation toward novelty and risk-taking (Amabile 1988). Specifically, employees often have trouble focusing on creative work when they face threatening evaluations and unrealistic expectations of productivity (Amabile 1988; Amabile et al. 1996). In contrast, working in an environment in which risk-taking is tolerated and exploration of new ideas is encouraged is conducive for creative work (Amabile et al. 1996). Recognizing effort and rewarding creative work are indicative of an organisational culture that is supportive of creativity (Amabile 2018), as well as offering work assignments that match employees’ skills and interests and that offer opportunities for professional growth (Amabile et al. 1996).

3 A MODEL OF IT-ENABLED INDIVIDUAL CREATIVITY

In this section we put forward a model grounded in the aforementioned theoretical framework. Specifically, the model links individual-level components – IT fluency and IT mastery motivation – with IT-enabled idea generation capability, while controlling for the componential theory of creativity’s third component, namely creativity-relevant skills. The model further incorporates organisational and social components – namely, IT training, learning culture, peer-based IT support, and perceived IT advocacy. The model is focused on the IT artefact and its role in enabling idea generation.

3.1 IT-Enabled Idea Generation Capability

When employees generate ideas, they need to understand the nature of the problem they wish to solve and to obtain relevant information about the problem and its possible solutions (Amabile 2018). These requirements suggest that an IT-enabled idea generation capability would allow employees to scrutinize work-related problems, search for those problems’ causes, and understand their implications. Employees may use features that IS research on creativity support systems identified as conducive for idea generation (Schniederman 2007). For example, using accessibility, navigation, and editability features could help employees to identify opportunities for improving customer service (Orilkowski 2000). And submitting complex queries to a common database could yield important business insights (Karahanna and Agarwal 2006). We propose that having the ability to use an IT in such an exploratory way can help employees break out of routines and adopt fresh perspectives with which to analyse business problems and opportunities, thereby facilitating the search for new methods and techniques, and enabling the development of original solutions to problems and ideas for improvement.

In the following section we theorize relationships among two of the three individual-level components and the IT-enabled idea generation capability.1 Specifically, the variance model that emerges (see H1

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1 We specifically focus on the two components that can be framed in the IT context. For theoretical completeness we included the third component – individual creativity skills – as a control variable in the model.
and H2 in Figure 1) describes how employees’ characteristics determine their ability to use a new organisational IT to generate creative ideas.

![Theoretical Model](image)

**Figure 1.  Theoretical Model**

### 3.2 Employee-Focused Hypotheses

This section first defines and then describes how employees’ IT fluency and IT mastery motivation impact IT-enabled idea generation capability. According to the componential theory of creativity, domain-relevant skills include an individual’s general knowledge in a certain field, understanding of facts, principles, opinions, familiarity with paradigms, technical abilities, and special talents (Amabile 1983). The larger this skillset, the broader the range of options for creating something new and useful (Amabile 1988). Maintaining an IT centric view, we begin our discussion by reflecting on how a key domain-relevant skill – IT fluency – can impact IT-enabled idea generation.

Building on the componential theory of creativity’s view of domain-relevant skills and identifying the relevant domain as a new IT, we define IT fluency as the extent to which employees believe they are familiar with, and feel comfortable using, the focal IT, and whether they understand how to use its features and functionalities.

In a similar manner, we build on the theory’s view of intrinsic task motivation and define IT mastery motivation as voluntary actions taken by employees in order to enhance their understanding of the focal IT’s features and functionalities, including the logic behind them.

We propose that IT fluency would impact employees’ ability to use the technology for generating creative ideas. Creativity begins with problem recognition (Scott and Bruce 1994), and past research found that individuals are more likely to be creative when they discover problems on their own, than when they are provided with problems to work on (Runco and Okuda 1987). IT fluency can facilitate problem discovery and enrich the range of solutions one can envision: when employees know a great deal about an IT, they can temporarily modify parameters and subroutines to produce alternative and complementary views of organisational processes, uncover inefficiencies and discover clues for their solutions.

IT fluency can indicate familiarity with technological capabilities that extend beyond one’s job responsibilities, allowing her to use the IT for approaching problems from diverse angles. Additionally, broad knowledge of an IT’s various features and functionalities can help employees consider a large number of different combinations when exploring challenging problems (Nevo et al. 2016). Moreover, since visual imagery can stimulate creative ideas (Finke et al. 1992), an ability to control what a technology displays can help to envision different solutions.
Adding to the above, IS research found that users who feel competent and in control when they interact with computers tend to experience positive moods, such as playfulness and spontaneity, and are less likely to experience negative emotions such as anxiety (Webster and Martocchio 1992). When individuals are relaxed and enjoy their vocation there is greater chance that they would engage in creative acts (Csikszentmihalyi 2014). IT fluency can make employees feel comfortable enough to ‘play’ and experiment with a new IT and to seek novelty. Hence,

**Hypothesis 1: There is a positive relationship between IT fluency and the IT-enabled idea generation capability.**

We propose that employees are more likely to produce IT-enabled creative work when they are motivated to develop mastery with the new technology. Intrinsic motivation is associated with an inclination toward task mastery, a tendency to seek out challenges and novelty, to develop skills, and to explore and learn (Ryan and Deci 2000). When individuals are self-motivated they can perform at high levels, they persist in a task when faced with obstacles, and they tend to be more creative (Amabile 2018).

The IS literature provides evidence regarding the positive impact of intrinsic motivation on IT-related outcomes such as deep cognitive engagement (Agarwal and Karahanna 2000), acceptance (Venkatesh et al. 2003), knowledge transfer (Ko et al. 2005), and code contributions (von Krogh et al. 2012). Beyond the notion that intrinsic task motivation is conducive for creativity, we expect that efforts to master a new IT would enhance employees’ abilities to generate new ideas. Specifically, IT mastery motivation involves several activities, such as learning as much as possible about a new technology, understanding not only what certain features can do but also the logic behind them, searching for and reading additional texts pertaining to the new IT, and devoting time to exploring its capabilities. These activities are likely to broaden the employee’s scope of actions that the technology can support. Employees who master a new technology are more likely to recognize opportunities for using it in a variety of ways. Hence,

**Hypothesis 2: There is a positive relationship between IT mastery motivation and the IT-enabled idea generation capability.**

### 3.3 Organisational and Social Antecedents of Employees’ IT Fluency

An important aspect of the guiding framework is the inclusion of employees’ work environment and its impact on creative work. However, the majority of elements or resources studied are characteristics of the organisation and its management (e.g., management styles, work autonomy, workload, top management’s orientation toward innovation), and the social elements, such as peers and the knowledge they possess, receive little attention (Amabile 1988). This is unfortunate because IT artefacts are socio-material assemblages, and how they are used and for what purposes are shaped by social interactions between users and other members of the organisation (Orlikowski 2007). Consequently, we argue that when studying IT-enabled individual creativity it is vital to consider social resources in addition to organisational resources.

The availability of training on essential subjects is an important resource in the relevant domain (Amabile 1988). IT training sessions in which employees can learn about the intended objectives of the technology, observe demonstrations and take part in hands-on training are thus an important resource that organisations can offer to users. Employees have opportunities to ask about difficult aspects of the technology, and to learn how to use the technology in their line of work. Of course, it is not enough that this important resource is offered by the organisation, employees need to attend the training sessions. The IS literature provides examples in which training sessions were made available but many employees did not attend them and thus remained uninformed with regard to new organisational IT (Boudreau and Robey 2005). Hence,

**H3a: There is a positive relationship between IT training and IT fluency.**
Peers with complementary and useful knowledge and expertise in the domain, who are accessible and open to new ideas, may also be considered a relevant resource (Amabile et al. 1996). In academic setting, peer support can enhance student learning and play a key role in their success; forming study groups, sharing notes and experiences, and giving advice about which classes to take can be instrumental for attaining higher grades and adjusting better to the college environment (Dennis et al. 2005). In the context of technology acceptance, peer support, where colleagues with greater expertise explain the relevance of certain features, and offer easy-to-follow steps for proper executions of a non-trivial application can enhance adoption and use (Sykes et al. 2009). Such informal technical support, which we term peer-based IT support, can instil a sense of greater control over a new system, as illustrated in the following:

... I decided that I should try to learn the new system. I’m grateful to Mark, he is a nerd and he helped me a lot to learn how to use the system. I always ask him when I have a problem... Now I use it all the time. It is completely integrated into my job (Beaudry and Pinsonneault 2005:514).

We argue that peer-based IT support can be especially valuable because peers are likely to be familiar with the tasks and routines in which the IT is used, and with the business processes it is intended to support. This allows peers to put their explanations in context, thereby enhancing the help seeker’s ability to understand how to use the new technology. Thus, when organisations implement new IT, access to peers who can provide explanations, technical advices, and demonstrate use can be a valuable social resource, and their help can be instrumental in strengthening IT fluency. Hence,

**H3b: There is a positive relationship between peer-based IT support and IT fluency.**

### 3.4 Organisational and Social Antecedents of IT Mastery Motivation

According to the componential theory of creativity, organisations can enhance employees’ intrinsic motivation. Organisations can demonstrate that innovation is valued, support the undertaking of justified risks, care about employees’ skills and development, and encourage exploration of new ideas (Amabile et al. 1996; Amabile and Pratt 2016). Under such conditions, employees experience a work environment that inspires them to learn and explore, and they feel empowered to make decisions on their own and take actions without direct supervision or intervention (Zhang and Bartol 2010).

Drawing on the above, we argue that when a new IT is implemented, employees whose organisations embrace a learning culture would be motivated to master the new technology. In organisations with a learning culture, employees experience continuous learning opportunities, receive help understanding their jobs and seeing the impact of their work, are recognized for their efforts not only their successes, and mistakes that arise from attempts to perform better and to promote skill development are tolerated (Marsick and Watkins 2003). When employees believe their organisation values and promotes learning, they feel greater motivation to develop mastery in the knowledge and skills that would be useful in their job-specific contexts (Egan et al. 2004; Joo and Lim 2009). Accordingly, we expect that when employee-based innovation involves a potentially complex IT artefact with uncertain impacts and numerous features and functionalities, employees’ efforts to gain technological mastery would be influenced by the organisation’s learning culture. In particular, we anticipate that when employees perceive their organisation as truly invested in their professional development, they would devote time to explore and learn the new IT, and to research interesting and potentially useful functions to be valued by the organisation. Hence,

**H4a: There is a positive relationship between learning culture and IT mastery motivation.**

We further propose that employees’ motivation to master a new IT can be influenced by what they believe other members of the organisation, whose opinions they value, think about the technology. The componential theory of creativity arose from research on the social psychology of creativity (Amabile 1983; Amabile et al. 1996; Amabile and Pillemer 2012), and it explains how various components in the
social environment (e.g., reward structures and job autonomy) can influence an individual’s creative work (Amabile 1988). The broader social psychology literature recognizes the important role that peers and other organisational members play in influencing individuals’ behaviour (Ashforth and Mael 1989; Woodman et al. 1993). Accordingly, we argue that when employees perceive that important members of a respected social group express positive opinions regarding a new IT, identification with the group and a desire to receive its members’ approval would lead employees to pursue mastery of the new technology.

Social influence can occur when individuals identify strongly with certain social groups and modulate their behaviours according to the perceived norms espoused by those groups (Terry et al. 1999). Emulation of behaviours that are consistent with group norms can facilitate group membership and elevate a person’s social status (Hogg and Reid 2006; Pfeffer 1982). Further, individuals compare themselves to others and they enact behaviours that would make them more similar to members of an aspirational group and that would emphasize dissimilarities with other groups (Hogg and Reid 2006; Terry and Hogg 1996). Because IT mastery can be observed and recognized by other organisational members (Beaudry and Pinsonneault 2005), it can increase the chance of elevating social status. Employees may come to expect that through mastery of a new IT they would strengthen their identification with a social group that advocates for the technology (e.g., the techies), and reason that technological mastery would impress that group, thus raising the likelihood of obtaining the its recognition. At the same time, IT mastery can situate socially employees further away from other groups with which the former does not wish to be associated (e.g., the luddites). Consequently, devoting more time to reading and learning about the technology’s features and functionalities, and trying to understand not only how to use them but also the logic behind them, can help to accentuate similarities with a group that one perceives to be an enthusiastic supporter of a new IT, and underscore dissimilarities with groups that express unfavourable opinions regarding the technology. Hence,

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H4b: \text{There is a positive relationship between an aspirational group’s perceived IT advocacy and IT mastery motivation.}
\]

4 Empirical Assessment

To test of our model, we carried out an online survey that was administered by a professional survey company. Respondents were screened to ensure they work, full-time, in an organisation with at least 10 employees and that has undergone an IT implementation within the past six months, and that they are users of that IT. Invitations to participate in the survey were sent to one thousand individuals. Three hundred and thirty-seven usable and complete questionnaires were obtained.

4.1 Measurement Scales

The scales used are presented in Table 1. All scales were treated as reflective. Demographics and control variables that were included in the questionnaire are summarized in Table 2.

To measure the dependent variable, IT-Enabled Idea Generation Capability, we developed a scale using items from Janssen’s (2000, 2001) scale for innovative work behaviour, which includes three items for idea generation.
IT-Enabled Idea Generation Capability

The new IT allows/enables me to create new ideas for improvement at the workplace. 0.834
The new IT allows/enables me to search out new working methods, techniques, or instruments. 0.919
The new IT allows/enables me to generate original solutions to problems. 0.873
Considering its difficulty and my technical skills, I have no problem using the new IT. 0.855
I can use its features/functionalities successfully. 0.848
I can use almost all the features/functionalities. 0.822
I can operate even the most difficult features/functionalities. 0.812
Compared with other users, I think I know a great deal about the new IT. 0.815

IT Fluency

I try to understand completely the logic and purpose behind its features/functionalities. 0.798
I try to obtain more information about its features/functionalities. 0.858
I scrutinize the key features/functionalities until I understand them completely. 0.776
I spend a lot of my free time finding out more about interesting features/functionalities. 0.856
I read everything I can about the new IT. 0.835

IT Mastery Motivation

In my organisation, a real effort is made to recognize employees for their effort and improvement. 0.825
In my organisation, real effort is made to show employees how their work contributes to the organisation’s effectiveness. 0.810
In my organisation, employees are encouraged to get better at their jobs. 0.831
In my organisation, employees are encouraged to develop continuously their skills. 0.863
In my organisation, mistakes are tolerated as long as employees do their best and learn from their mistakes. 0.753
In my organisation, the emphasis is on really understanding the job, not just mindlessly executing tasks. 0.789

Learning Culture

In my organisation, people who influence my behaviour think I should use the new IT. 0.860
In my organisation, people whose opinions I value prefer that I use the new IT. 0.922

Peer-Based IT Support

In my organisation, people who influence my behaviour think I should use the new IT. 0.860
In my organisation, people whose opinions I value prefer that I use the new IT. 0.889

Table 1. Items’ Texts and Loadings

For the explanatory variables, we drew on relevant literatures from creativity in organisations, IS, and learning theories. Starting from the top left-hand side of the model, IT training was measured using a single question (Were IT training sessions provided?) and five possible answers ranging from (Yes, and I attended all of them, Yes, but I attended only some of them, Yes, but I did not attend them, No, and I don’t know). We treated this variable as ordinal scale after removing the responses of those who answered ‘No’ (no one answered ‘I don’t know’). The final number of valid responses used in the data analysis was 316 (final response rate of 31.6%). The Patterns of Adaptive Learning Scales (PALS, Midgley et al. 2000) informed our development of the Learning Culture scale. Next, the Motivated Strategies for Learning Questionnaire (MLSQ) developed by Pintrich and his colleagues (Pintrich and DeGroot 1990; Pintrich et al. 1991) was used to inform the operationalization of Peer-based IT Support. Finally, the scale for Perceived IT Advocacy was adopted from Venkatesh et al. ’s (2012) Social Influence scale.

Moving to the individual-level components, the scale for IT Fluency was based on Harackiewicz et al.’s (2000) scale for Perceived Competence, as well as Pintrich and DeGroot’s (1990) scale for Academic Self Efficacy. The scale for IT Mastery Motivation was operationalized based on the Study Process Questionnaire (SPQ) developed by Biggs et al. (2001).
Nevo et al. /IT-Enabled Idea Generation Capability

Demographics

| Time since Implementation: | <1 month (9%); 1-2 months (27%); 3-4 months (36%); 5-6 months (28%); |
| Implementation experience: | Attended training (whole or part) (95%); Successful past implementations (97%); Positive or neutral experience with current implementation (97%); |

Type of system that was implemented: Business Analytics Tools (23%); Expert System (3%); CAD/CAM and CASE Tools (6%); Knowledge Management System (10%); Customer Relationship Management (24%); Salesforce Automation (5%); Electronic Health Records (8%); Supply Chain Management (6%); ERP/MRP (14%); Other (3%)

Industry: Transportation or Utilities Services (4%); Retail Trade (10%); Medical Services (10%); Manufacturing & Processing (12%); Legal Services (2%); Government or Public Administration (3%); Finance, Insurance, or Real Estate (10%); Educational Services (9%); Construction (6%); Computer Programming, Data Processing, Other Computer Services (15%); Computer H/W, S/W Solutions (17%); Other (4%

Organisation Size: 10 to 49 employees (19%); 50 to 99 employees (12%); 100 to 499 employees (28%); 500 to 999 employees (17%); 1,000+ employees (25%)

Department/Workgroup Size: less than 20 people (32%); 20 to 49 people (25%); 50+ people (34%)

Work experience (overall, with current org., in current position): Less than 1 year (1%, 4%, 8%); 1 - 2 years (5%, 13%, 21%); 3 - 4 years (17%, 25%, 32%); 5 - 7 years (22%, 29%, 20%); 8 - 10 years (17%, 14%, 10%); More than 10 years (39%, 16%, 10%)

Gender: Male (53%); Female (47%)

Age: 20 to 29 (24%); 30 to 39 (42%); 40 to 49 (21%); 50 to 59 (10%); 60+ (3%)

Education: High school degree/Diploma (8%); Associate/Technical Degree (17%); Bachelor’s (48%); Master’s (23%); Ph.D./DBA/Other Doctorate (5%)

Table 2. Respondents’ Demographics

4.2 Reliability and Validity Checks

Because all scales were based on prior literature, we revalidated them in the context of this study using a pilot study. Table 1 provides item loadings for the reflective constructs. Tables 3 and 4 provide reliability and validity checks of the constructs. All the Cronbach’s alpha values exceeded the recommended cut-off of 0.7, the composite reliability scores were also above the 0.7 threshold and the average variance extracted (AVE) values were above the 0.5 cut-off (Straub et al. 2004).

Table 3. Variance Explained, Construct Reliability and Validity, Discriminant Validity (Fornell-Larcker Criterion)

Convergent validity was assessed using exploratory factor analysis (EFA) with all items loading well on their designated constructs. Discriminant validity was provided by the heterotrait-monotrait matrix (HTMT). The HTMT values in our model were well below the HTMT0.85 criterion and the HTMT inference criterion indicated that all values were significantly below one, both criteria indicating adequate discriminant validity (Henseler et al. 2015). Further, for each construct, the square root of the AVE is greater than the correlation values with all other constructs (Fornell and Larcker 1981), indicating good discriminant validity.
Methods bias stems from variance which is attributed to the measurement method rather than the constructs themselves (Podsakoff et al. 2003). It presents a risk to the validity of the statistical results by introducing additional measurement error (Sharma et al. 2009). Specific to common methods bias, the problem occurs when data are collected using a single instrument (Burton-Jones 2009), such as a single survey. While there are different proposed approaches to try and reduce, correct, or estimate the effect of common methods bias, there is lack of agreement regarding the effectiveness of these different approaches, and no single approach is universally considered a panacea (Podsakoff et al. 2003; Sharma et al. 2009). In this paper, several procedures were taken to minimize the risk of common method bias risk during the survey design stage, and to estimate its potential impact ex post. Procedurally, great care was taken in constructing the survey, maintaining respondents’ anonymity, incorporating validity and reliability checks throughout the questionnaire (such as reverse coded (RC) questions and two quality control (QC) questions)\(^2\), and separating the independent and dependent variables’ scales (Podsakoff et al. 2003). Statistical checks included Harman’s (1967) single-factor test as well as Lindell and Whitney’s (2001) marker variable approach. For Harman’s single factor test, the proportion of variance explained by the unrotated single factor was 34.7\%, indicating minimal risk of common methods bias. Finally, we followed the marker variable approach by incorporating indicators from a construct that was not theoretically expected to correlate with any of the other model’s constructs, Perceived Workload. It is assumed that correlations between these indicators and other model indicators are due to common methods variance (Lindell and Whitney 2001). We corrected for this common method variance and then ensured that the correlations between our model variables and the DV remained significant. Based on the above precautions we do not believe common methods bias to be a significant risk to our results and are confident in our ability to support our theoretical development with this survey data.

### 5 Findings

SmartPLS (v.3) was employed with 5,000 samples with a 0.05 or lower, two-tail level of significance to test the hypotheses that the path coefficients are different from zero. All the null hypotheses were rejected. These results are reported in Table 5.

Our results show that the IT-enabled idea generation capability is positively affected by the two main individual level components as well as by the controlled construct, creativity-relevant skills. The effect of IT fluency on IT-enabled idea generation capability (H1) was positive with a coefficient of \( \beta = 0.1778 \) and \( p < 0.001 \). The effect of IT mastery motivation on IT-enabled idea generation capability (H2) was positive with a coefficient of \( \beta = 0.2229 \) and \( p < 0.001 \). For creativity-relevant skills \( \beta = 0.2713 \) and \( p < 0.001 \). Focusing on the organisational and social components, our results further show that IT fluency is affected by IT training (H3a), with a coefficient of \( \beta = 0.3352 \) and \( p < 0.001 \), and by peer-based IT support (H3b) with a coefficient of \( \beta = 0.2536 \) and \( p < 0.001 \). IT mastery motivation is positively affected by the organisation’s learning culture (H4a) with a coefficient of \( \beta = 0.2042 \) and \( p < 0.005 \), and by an aspirational group’s perceived IT advocacy (H4b) with a coefficient of \( \beta = 0.1829 \) and \( p < 0.010 \).

\(^2\) One question instructed respondents to select ‘3’ and the other to select ‘7’. These QC questions were embedded within two different sets of statements.
By taking into account support systems for research, tools, CASE Tools, CAD/CAM Tools, Expert Systems, Knowledge Management Tools, Enterprise Systems, Supply Chain Management Systems, MRP/ERP Systems, Electronic Health Management Systems, knowledge work tools, Business Analytics Tools, CASE Tools, CAD/CAM Tools, Expert Systems, Knowledge Management Tools. This dichotomous variable had a value of ‘1’ for Enterprise Systems and ‘0’ for Knowledge Work Tools. The PLS analysis shows that when the IT artefact in question belongs to the group of enterprise systems, respondents reported stronger motivation for IT mastery. Perhaps the complexity of those systems, the fact that they tend to transcend multiple business units, and the potential impact on the organisation presented a challenge that aroused intrinsic motivation.

The model also includes several control variables that provide further interesting results. First, the type of IT implemented had a significant effect on employees’ IT mastery motivation. Here, the 11 technologies listed in Table 2 were classified as either Enterprise Systems (Customer Relationship Management Systems, Supply Chain Management Systems, MRP/ERP Systems, Electronic Health Records Systems, Sales Force Automation Systems) or Knowledge Work Tools (Business Analytics Tools, CASE Tools, CAD/CAM Tools, Expert Systems, Knowledge Management Tools). This dichotomous variable had a value of ‘1’ for Enterprise Systems and ‘0’ for Knowledge Work Tools. The PLS analysis shows that when the IT artefact in question belongs to the group of enterprise systems, respondents reported stronger motivation for IT mastery. Perhaps the complexity of those systems, the fact that they tend to transcend multiple business units, and the potential impact on the organisation presented a challenge that aroused intrinsic motivation.

Second, we controlled for past outcomes of IT implementations, assessing whether they were perceived as generally successful or not. The results show that when previous implementations were deemed successful, respondents’ motivation to gain IT mastery with the new technology was higher. It appears that when employees perceive previous experiences to be positive they are more motivated to master the new technology, possibly because they expect it to be accepted and incorporated into the organisation’s IT infrastructure, thereby justifying the allocation of resources needed to augment one’s knowledge. Furthermore, the analysis shows that this control variable positively moderates the effect of learning culture’s impact on IT mastery motivation. That is, the positive impact of an organisational learning culture on employees’ mastery motivation is further enhanced in light of successful past implementations of technologies.

### 5.1 Control Variables

The model controlled for creativity-relevant skills as a potential driver of IT-enabled idea generation. We controlled for this variable because it is one of the three components that are hypothesized to operate directly on the individual. We did not develop a hypothesis for this variable because the study’s focus is on IT-related variables. The statistical analysis showed that creativity-relevant skills had a positive (.2713) and significant ($p < 0.001$) effect on the dependent variable.

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### 6 Discussion

In this paper we theorize the impact of IT on individuals’ idea generation. Our theoretical model is grounded in the componential theory of creativity (Amabile 1983; Amabile et al. 1997; Amabile and Pratt 2016). Drawing on this foundation, we introduce two individual-level components – i.e., IT fluency and IT mastery motivation – that can function as the main drivers of an IT-enabled idea generation capability. This is based on expectations that (1) technological expertise would make it easier to modify a new IT to better recognize problems and to discover greater variety of solutions (IT fluency) and (2) self-motivated exploration of a new IT would lead to the discovery of useful features and functionalities that would expose opportunities for creating something original and valuable (IT mastery motivation). The empirical analysis supports the theoretical associations and the individual-level drivers explain 24.5% of the variance in IT-enabled idea generation capability (see Table 3).

For research, the paper raises the possibility that focusing attention on a specialized subset of creativity support systems can engender an overly narrow view of the role IT can play in supporting creativity. By taking into account the creativity enhancing potential that is embedded in any new technology, this
paper helps to illuminate IT’s broader impact in organisational creativity. We focus particularly on two paths to supporting creativity with IT, one augmenting individuals’ ability to use the IT creatively by enhancing their IT fluency, and the other by augmenting individuals’ willingness to use the IT creatively by enhancing their IT mastery motivation.

The paper also describes how resources in the employee’s social and work environment can influence the aforementioned drivers. In particular, we theorize that employees’ perceptions of their own IT fluency are strengthened when the organisation offers formal training classes, and when their peers are willing to provide informal technical support. We also theorize that the degree to which employees are motivated to gain mastery with a new IT will be stronger if they believe that the organisation espouses a learning culture, and that a group to which they aspire to belong advocates for the new IT. These hypotheses, too, are borne out by the data analysis.

The results of the present study add to the growing body of research on how and when users engage in post-adoption behaviours and the benefits those behaviours can provide to users and to the organisations of which they are members. Along with affordances (Leonardi 2011), technology adaptations (Beaudry and Pinsoneault 2005), and IT reinventions (Nevo et al. 2016), IT-enabled creativity can be a valuable employee-centric activity that can occur when new organisational IT are implemented. Moreover, organisations are not relegated to the role of bystanders; they can influence the extent to which employees choose to leverage IT to generate novel and useful ideas.

Lack of these resources in the employee’s work and social environment can explain why organisations might fail to innovate with IT despite having knowledgeable and creative employees. At the same time, they also point to ways in which organisations can promote creativity. Hence, to encourage employees’ motivation to gain IT mastery, organisations need to make sure that they promote a learning culture, that this culture is communicated clearly, and that the remuneration and promotion structures and recognition of achievements are aligned with this culture. Organisations should also be on the lookout for groups who show resistance toward a new IT since their opinions could influence individuals who look up to such groups and who take cues from them regarding desirable workplace behaviours. To promote a sense of fluency with a new IT, organisations should offer formal training sessions and encourage employees to attend them, and they should promote peer support, a form of informal training that can seem less threatening and better tailored to employees’ work responsibilities. These resources will likely signal to members of the organisation that exploring a new IT and devoting time to learn about it are worthwhile.

In sum, organisations aiming to derive creativity benefits from their IT should allocate resources to ensure employees feel safe to experiment with the new IT and collaboratively learn about its myriad features and functionalities. Further, nurturing an organisational learning culture and positive attitudes toward the IT can strengthen employees’ motivation to master the new IT. Mastery motivation, in turn, leads to willingness to explore new features, experiment, and innovate, garnering creative value from the IT.

6.1 Limitations and future research

The empirical evidence is encouraging. Nevertheless, we recognize the limitations of a single cross-sectional survey using a common method and we hope that future research will employ longitudinal or multi-method techniques.

Future research may extend our model to study whether and how organisations implement ideas that emerge out of IT use, and what impact does organisational response has on future creativity. Specifically, it would be interesting to study patterns of idea generation over time. Another interesting research direction is to study specific attributes of the IT and their impact on creativity. In this work, we focused on relatively rich and complex organisational IT (see Table 2). We did conduct a post-hoc analysis to see whether the type of IT impacted our model, as described in section 5.1, and future research can build on these early insights to better understand the attributes of the technology that are more, or less, likely to lead to creative behaviour. Related to this, our work is focused in the early post-implementation stage identified by Tyre and Orlikowski (1994) as a window of opportunity for modifications and change. Future research can explore whether the same drivers apply during other stages of an IT’s life cycle. Finally, to the extent that IT-enabled idea generation and other post-
adoption behaviours share some aspects, our model may be extended by incorporating elements from post-adoption research. For instance, agency in general, and temporal agency in particular (Nevo et al. 2016), may play a role in individual IT-enabled idea generation capability where the capacity to move hypothetically forward in time could influence an employee’s ability to generate novel ideas.

References


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