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The Surprising Effect of Technological Uncertainty on User Innovation: Uncertainty Can Increase Innovation by Generating Eustress

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Research idea

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Abstract

This research idea explores the role of eustress as a mediator between technological uncertainty and user innovation. Based on theories of uncertainty reduction, it develops a competitive mediation model hypothesizing that the relationship between technological uncertainty and user innovation that is generally negative becomes positive when eustress is considered as a mediator. It also indicates that the attention performance of users moderates the positive indirect effect of technological uncertainty through eustress on user innovation such that this indirect effect is greater for higher levels of attention performance. A method for testing the model is suggested, and potential contributions are discussed.

Keywords: User innovation, Innovativeness with IT, Uncertainty, Eustress, Technology.

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Research idea

Successful firms like Microsoft, 3M, or Nike encourage their employees to innovate with IT in order to realize the full potential of their existing IT infrastructure (Ahuja & Thatcher, 2005; Tams et al., 2018). Such innovation with IT, also known as *trying to innovate with IT,* is defined as a user's goal of finding new uses of existing workplace information technologies (Ahuja & Thatcher, 2005). It is a form of post-adoptive use that is far richer than basic usage intentions or frequency of use (Burton-Jones & Straub 2006; Jasperson et al., 2005; Tams et al., 2018). Specifically, user innovation implies that users move from using basic features of a tool to richer, broader, and often less-expected but beneficial applications of it. As an IT evolves, users can either continue to use the technology in familiar ways or identify new ways to take advantage of new or existing but under-utilized functionality. Since users generally do not receive new training on every software update, they may often miss opportunities to use the new functionality. For example, the Excel 2018 update added new functionalities such as improved support for emojis and other complex characters as well as the option to use Ctrl-A to select text in a cell (Gralla, 2018). Absent goals toward innovation with IT, users might easily miss these new features and ultimately derive less value from the system compared to what it affords. Therefore, users who have formed goals to try out new IT features should innovate at a higher rate, which improves the effectiveness of their IT usage.

Research on user innovation has identified several important individual differences that motivate employees to innovate with IT. These include autonomy, technology cognizance, and the ability to explore a technology, among others (Ahuja & Thatcher, 2005; Nambisan et al., 1999; Tams et al., 2018). However, only a few studies have examined to what extent user innovation is driven by technological characteristics. The focus has been on technological uncertainty, which refers to constant changes and upgrades of technology (Fuglseth & Sorebo 2014). It has been argued that uncertainty reduces user innovation because it generates distress (Fuglseth & Sorebo 2014; Liao et al., 2015; Wang et al., 2013). Yet studies examining the broader nomological network of technological uncertainty have suggested that uncertainty can also create pleasurable experiences when it interacts with users' cognitive abilities (Kang, 2017). Therefore, the role of technological uncertainty in user innovation may be more complex than presently assumed. To examine the relationship between both constructs in greater detail, we present a competing mediation model. This model argues that technological uncertainty can, in fact, increase user innovation, especially under certain conditions. Specifically, increased user innovation occurs when technological uncertainty interacts with users' abilities to pay attention to their technological environment. We theorize that paying attention to the technological environment allows users to emphasize the positive aspects of technological uncertainty in their mental calculus, thereby generating eustress (as opposed to distress), which is a pleasurable experience that can ultimately drive user innovation.

We develop our research model on the basis of the Uncertainty reduction model put forth by Luck et al. (1996), which suggests that attention can buffer against the negative impacts of uncertainty on behavior. Our research model is developed in three steps. Step 1 is the baseline. In this step we demonstrate, consistent with past research, that technological uncertainty has a negative, direct effect on user innovation. Technological uncertainty has this effect because it causes distress which, subsequently, reduces the extent to which users innovate with IT. Step 2 offers a competing model. It introduces our competitive mediation model, indicating that the relationship between uncertainty and user innovation changes when eustress is added to the model. Specifically, this relationship becomes positive when eustress is added as a mediator between uncertainty and user innovation. This is because eustress, as opposed to distress, has a positive relationship with user innovation. Finally, step 3 contextualizes and completes our competitive mediation model. It suggests that the positive indirect effect of uncertainty on user innovation via eustress only manifests itself for users with efficient attention performance and not

for those who lack the ability to pay attention to their technological environments. Thus we suggest in step 3 that the indirect effect depends on users' attention performance. The formal research model follows:

Baseline

H1: Technological uncertainty is negatively related to user innovation.

Competitive mediation model

H2a: Technological uncertainty is positively related to eustress.

H2b: Eustress is positively related to user innovation.

H2c: There is a positive, indirect effect of technological uncertainty through eustress on user innovation; that is, eustress is responsible for the positive effect of uncertainty on user innovation (mediation).

Boundary condition for competitive mediation model (1st stage moderated mediation)

H3: The positive, indirect effect of technological uncertainty through eustress on user innovation depends on a user's attention performance; specifically, the mediated relationship between uncertainty and user innovation (via eustress) will be more pronounced for higher levels of attention performance.

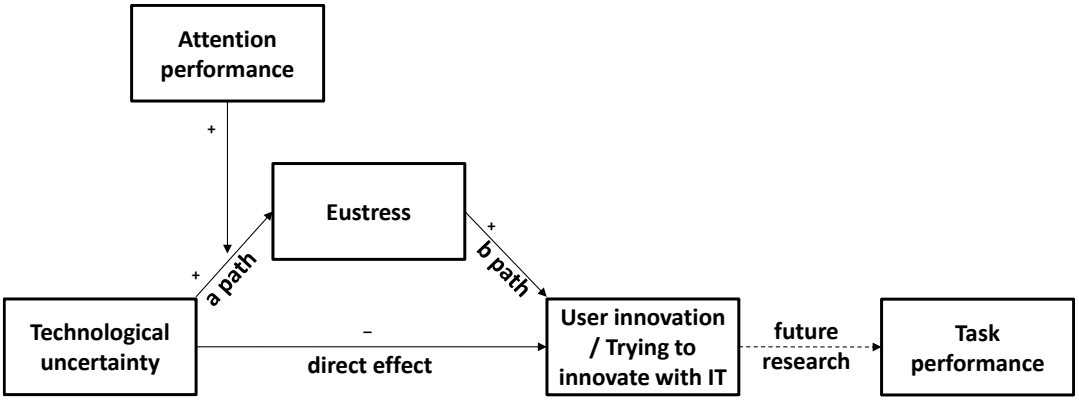

Figure 1. Research Model

Construct	Definition	References
Technological uncertainty	Extent to which a technology changes on a constant basis.	Dimoka et al., 2012; Ragu-Nathan et al., 2008
Eustress	A positive appraisal of demands in the environment that arises when the demands are appraised as promoting personal growth.	Cooper et al., 2001; Podsakoff et al., 2007; Selye, 1974; Tarafdar et al., 2017
User innovation / Trying to innovate with IT	A user's goal to find new ways of applying technology to their tasks.	Ahuja & Thatcher, 2005; Tams et al., 2018
Attention performance	Extent to which users can efficiently allocate their limited mental recourses to their goals.	Strayer & Drews, 2007

Table 1. Construct Definitions

The model will be tested using a large-scale survey. Data from a pilot test offered some initial support. Overall, the research idea presented here seeks to improve understanding of the complexity inherent in the relationship between technological uncertainty and user innovation, with a potential link to task performance that future research should explore in more detail. Additionally, this study will stimulate more IS research advancing competitive mediation and moderated mediation models, both of which are seldom done in our field but crucial for theory development and testing (Cohen et al., 2003; Gregor, 2006). For practice, effective managerial interventions are needed to ensure that users can pay attention to their technological environments. This can be accomplished by introducing attention-aware systems (Bailey & Konstan, 2006) and by giving users sufficient slack time to make sense of technological changes.

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