DO TECHNOSTRESS CREATORS INFLUENCE EMPLOYEE INNOVATION?

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Abstract

Despite the spurt of active research in the field of technostress, two research gaps are particularly noteworthy. First, though past studies have described 'technostress creators' through five dimensions which include techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty, the individual impact of each dimension of technostress creators on job outcomes has not yet received enough attention. Most research conceptualizes 'technostress creators' through an aggregated single construct comprising the above mentioned five dimensions. Second, though the past research on stress and coping suggests an inverted U-shaped relationship between stress and job outcomes as demonstrated through the Yerkes-Dodson Law, this relationship has not been examined for the technostress context. In this research-in-progress paper, using Transactional Model of Stress and Coping (TMSC) as the guiding theoretical framework we first theorize the linear and quadratic relationships of individual technostress creators with employee innovation performance. Next, we intend to test the theorized relationships via a field survey of senior organizational employees who regularly use information and communication technologies (ICTs) for their professional tasks. Through this study, we expect to offer a nuanced theoretical understanding about the nature of technostress creators and their impact on employee innovation. On the practical front, the study has implications for managers intending to design technology related managerial interventions.

Keywords: Technostress, technostressors, employee innovation, inverted u-shaped relationship.

1. INTRODUCTION

As businesses continue to expand across the globe, organizations are continuously looking for innovative collaborative technologies to overcome the problems of distance and time and interact effectively with their globally distributed employees, customers and other business partners for creating business value. The organizational quest to incorporate such ubiquitous technologies for their business processes has risen dramatically in recent years. Although such pervasive technologies can augment organizational productivity by allowing employees to be more connected and responsive to work issues, they may promote negative outcomes such as work overload and stress due to excessive technology dependence and monitoring (Bulgurcu et al. 2010). Organizational employees spend as much as 28% of their working time dealing with interruptions from multi-tasking mainly due to new technologies, which results in significant psychological costs. In addition, it is quite common for employees to experience problems such as loads of emails waiting for their attention, busy servers and connection breakdowns. Moreover, the convenience and connectivity afforded by new information and communication technologies (ICTs) raises management expectations for productivity resulting in additional stressors for employees (Wang et al. 2008). The computerization of work environment and the continued efforts required by employees to master the frequent introduction of new ICTs also contributes to stress amongst employees. Such stress, which is the result of employees' constant need to adapt to new applications, functionalities, workflows and technical skills, is termed as 'technostress' (see Ragu-Nathan et al. 2008).

Prior research has established that professionals experience technostress when they cannot adapt to or cope with information technologies in a healthy and positive manner (see Srivastava et al. 2015). They feel compelled to: stay connected, share constant updates, respond to work-related information in real-time, and engage in almost habitual multi-tasking. In addition, because of faster information flows, such employees feel obligated to work faster and thus have little time for creative and meaningful thinking. Prior research has also established that technostress can result in perceived work overload and information fatigue leading to demotivated and dissatisfied employees (see Ayyagari et al. 2011, Ragu-Nathan et al. 2008, Tarafdar et al. 2007). Thus, in today's technological environment, it is imperative for managers to have a clear understanding of the technostress creators and their impact on job outcomes. Our research seeks to extend this understanding which we believe will be valuable for both research and practice.

Recent years have seen substantial amount of research on the topic technostress and technostressors from different perspectives. For example, technostressors have been studied in understanding their impact on employee productivity (Tarafdar et al. 2007) and end-user satisfaction (Tarafdar et al. 2010). In addition, technology characteristics have been studied as key factors inducing technostress (Ayyagari et al. 2011). Cognitive factors such as self-efficacy and technology dependence have also been examined in relation to technostressors (Shu et al. 2011). Despite the wealth of research on the subject, two gaps are particularly noteworthy. First, though past studies have described technostress creators through five dimensions which include *techno-overload, techno-invasion, techno-complexity, techno-insecurity* and *techno-uncertainty* (Tarafdar et al. 2007), the individual impact of each dimension of technostress creators on job outcomes has not yet received enough attention in information systems (IS) research. Most technostress research has conceptualized technostress creators through an aggregated single construct comprising the above mentioned five dimensions. It will be theoretically and practically interesting to understand how each of these five dimensions of technostress creators, individually, influence the job outcomes. Second, though the past research on stress and coping suggests an inverted U-shaped relationship between stress and job outcomes as demonstrated through the Yerkes-Dodson Law (see Anderson et al. 1989; Lupien et al. 2007) and IS studies have indicated the possibility of inverted-U-shaped relationships between technostress creators and ICT-enabled job outcomes (Srivastava et al. 2015), this relationship has not been examined in detail for the technostress context. Our main thesis is that job outcomes are influenced differently by each of the technostress creators and furthermore the technostress creators follow the Yerkes-Dodson Law and thus result in higher job outcomes when employees experience a moderate level of technostress creators. The employee performance should thus normally follow an inverted U relationship with the level of technostress creators.

Motivated by these two significant gaps and the need for nuanced understanding about the different dimensions of technostress creators, in this research, we theorize and examine the impact of technostress creators (linear and quadratic) on one such job outcome namely employee innovation performance through ICT, which is often an important parameter for organizations. The two specific research questions that we address in this research are:

RQ1: How does each technostress creator individually influences employee innovation?

RQ2: Does each technostress creator follow the Yerkes-Dodson Law and demonstrate the inverted-U relationship between technostress creator and employee innovation?

There are two primary contributions that this research-in-progress paper is expected to make. First, grounding our work in the Lazarus and Folkman's Transactional Model of Stress and Coping (TMSC) (1984), we theorize the individual impact of each of the technostress creators on employee outcome of innovation. This will guide the organizations to understand the impact of individual technostress creators and design appropriate managerial interventions (Tarafdar et al. 2011). Second, the quadratic effect of technostress creators on employee innovation presents the possibility of inverted-U-shaped relationships between technostress creators and ICT-enabled job outcomes which have not been tested in prior research. Such an understanding would offer nuanced insights on the nature of technostress creators which will be useful in stimulating further research on this important topic.

2. BACKGROUND THEORY

2.1 Technostress

The user dependence on technologies and the organizational quest to incorporate such technologies for their business processes has risen dramatically in the recent years. This surge in technology for organizational processes is demanding employees to constantly adapt to new applications, functionalities and workflows (Ragu-Nathan et al. 2008). As the organizational use of technologies becomes increasingly complex, synchronous, ubiquitous, multi-user, challenging and smarter, the organizational employees are finding difficult to cope with these technologies, leaving them increasingly frustrated and overwhelmed by continued efforts required to master them (Tarafdar et al. 2011). Recent literature has studied these cognitive responses to the use of technologies in workplace as the concept of 'technostress' (Clark & Kalin 1996; Weil & Rosen 1997; Brillhart, 2004; Ragu-Nathan et al. 2008; Tarafdar et al. 2011).

Technostress was a term coined by clinical psychologist Craig Brod in 1984 who described it as a modern disease caused by one's inability to cope or deal with ICT in a healthy manner (Ayyagari et al. 2011). Tarafdar et al. (2010) described technostress as the stress experienced by users as a result of application multitasking, constant connectivity, information overload, frequent system upgrades constant uncertainty, continual relearning and job-related insecurities as well as technical problems associated with the organizational use of ICT. Technostress is the phenomenon of "stress caused by an inability to cope with the demands of organizational computer usage" (Tarafdar et al. 2011, p.304). Ragu-Nathan et al. (2008) noted that the key reason for technostress is an individual's attempt to deal with constantly evolving technologies and their use. Current organizational processes involve outsourcing, virtual collaboration and knowledge intensive work, requiring individuals to continually interact with technologies causing potentially negative effects with its use (Ragu-Nathan et al. 2008). As aforementioned prior research has studied that technostress leads to perceived work overload, user frustrations, demotivated and dissatisfied users (Ragu-Nathan et al. 2008; Tarafdar et al. 2011). Thus, there is a negative psychological link between people and the introduction of new technologies. It is a result of altered habits of work and collaboration that are being brought about due to the use of modern information technologies at office and home situations. The organizational employees experience technostress when they cannot adapt to or cope with information technologies in a healthy manner. They feel forced to being connected and sharing constant updates, feel compelled to respond to work-related information in real-time, and engage in almost habitual multi-tasking. Employees also

feel pressured to work faster because information flows faster, and consequently have little time to spend on sustained thinking and creative analysis.

Stressors are the factors or conditions that cause stress (Tarafdar et al. 2010). In an organizational stress context, this stress can be due to an individual's role and task (Kahn et al. 1981; McGrath 1976). Role and task stressors have been widely studied (Tarafdar e al. 2010), hence, in this paper, we focus on technostress or the stress that has emerged among individuals as a result of ICT usage in organizations. Stressors associated with technostress are called technostress creators. There are five conditions that are classified as "technostress creators" (Tarafdar et al. 2007). "*Techno-overload*" describes situations where use of new technologies forces people to work more and work faster. "*Techno-invasion*" describes being "always exposed" where people can potentially be reached anywhere and anytime and feel the need to be constantly connected. The regular work-day is extended, office work is done at all sorts of hours, and it is almost impossible to "cut away". "*Techno-complexity*" describes situations where the complex computer systems used at work force people to spend time and effort in learning and understanding how to use new applications and to update their skills. People find the variety of applications, functions, and jargon intimidating and consequently feel stressed. "*Techno-insecurity*" is associated with situations where people feel threatened about losing their jobs to other people who have a better understanding of new gadgets and computing devices. "*Techno-uncertainty*" relates to short life cycles of computer systems. Continuing changes and upgrades do not give people a chance to experience at a particular system. People find this unsettling because their knowledge becomes rapidly outdated and they are required to re-learn things very rapidly and often.

2.2 Transactional Model of Stress and Coping (TMSC)

In this research, we will use Lazarus and Folkman's Transactional Model of Stress and Coping (TMSC) (1984) as a framework to explain how technostress creators influence employee outcomes. Stressful experiences can generally be conceptualized as person-environment transactions. These transactions depend on the impact of the stressors which are the demands made by the internal or external environment that upset balance, thus affecting physical and psychological well-being and requiring action to restore balance (Lazarus & Cohen 1977). External demands are the contextual or social environment and must be met by individuals (Beaudry & Pinsonneault 2005). On the other hand, internal demands are personal desires or requirements that the environment must meet (see French 1974). Stress results from an imbalance between demands and resources. We become stressed when demands or pressures exceed our ability to cope stress. Stressors are the conditions or factors that create stress. The stressors creating stress due to technology are called 'technostressors' or 'technostress creators', and the two terms have been used interchangeably in this research-in-progress paper (see Ayyagari et al. 2011; Tarafdar et al. 2010).

Stress is mediated by firstly the person's appraisal of the stressor and secondly by the environmental resources at his or her disposal (Lazarus & Cohen 1977; Antonovsky & Kats 1967; Cohen 1984). Coping is described in the form of cognitive efforts aimed at altering the subjective meaning of the taxing event, such as forming negative opinions or attitude, and/or behavioural efforts aimed at a specific behavioural outcome, such as avoiding or resisting change or seeking additional information or evidence to discredit change. When faced with a stressor, individuals cope with such disruptions using two key sub processes that continuously influence each other (Beaudry & Pinsonneault 2005; Lazarus & Folkman 1984). First, individuals evaluate the potential consequences of the event by doing an appraisal where primary appraisal is a person's judgment about the significance of an event as stressful, positive, controllable, challenging or irrelevant. Next faced with the stressor, the second appraisal follows, which is an assessment of person's coping resources and options (Cohen 1984). Secondary appraisals address what one can do about the situation. Second, individuals perform different actions to deal with the situation at hand which is their coping effort (Beaudry & Pinsonneault 2005; Lazarus & Folkman 1984). Thus, coping is the act of adaptation performed by individuals in response to disruptive events that occur in his/her environment.

Before beginning to perform coping efforts to deal with the situation in hand, the individuals assess the particular event and evaluate the potential consequences of that event (Beaudry & Pinsonneault 2005). The appraisal stage is very critical as individuals form positive or negative opinions about the event. The introduction of new ICTs in organizations are the disruptive stressful events that generate several expected and unexpected consequences in the user's environment that are understood in different ways by different individuals triggering complex user responses (Beaudry & Pinsonneault 2005; Griffith 1999; Pinsonneault & Rivard 1998). Primary appraisal is likely to be influenced by some social and institutional factors such as what peers and superiors think of the technology (Beaudry & Pinsonneault 2005), while in secondary appraisal the users assess the amount of control they have over the ICT event (Lazarus & Folkman 1984). The three components of control in the context of ICT are control over the work (autonomy over the job), control over self (how well users can adapt to new environment) and control over technology (over the features and functionalities of the IT) (Beaudry & Pinsonneault 2005). Cognitions about technologies and the control which a person has play a key role in determining the satisfaction and performance of end users in the context of ICT-enabled tasks (Tarafdar et al. 2010).

3. HYPOTHESIS DEVELOPMENT

Organizational employees evaluate and appraise each technostress creators as a separate disruptive event differently due to their varying internal and external demands (Beaudry & Pinsonneault 2005). In management, disruptive events are appraised as two main types: challenges (opportunities) to improve job performance (events perceived as having positive consequences) or threats to their job (events perceived as having negative consequences) (Beaudry & Pinsonneault 2005; Carpenter 1992; McCrae 1989). Lazarus and Folkman (1984) specified events as multifaceted that are perceived as comprising both challenges and threats.

Techno-overload, the first technostress creator, occurs when managers tend to communicate more than the required information and receive more information than what they can effectively process (Davis 2002; Tarafdar et al. 2010). As the employees get access to information at a faster pace, it leads to problems of information overload, multitasking, and modulates how employees function in the workplace. Consequently, they might feel threatened as they feel their control over work is diminishing due to information overload and control over self is also impacted as they are unable to adapt to the pace of information overload, leading to dissatisfaction. Information overload will also lead to a reduction in the available time consequently employees will focus only on the routine critical tasks rather than using ICT for creative and innovative tasks. Hence we hypothesize,

H1a: Techno-overload is negatively associated with employee innovation.

T*echno-invasion*, the second technostress creator causes the employees to be never free of technology and work. They perceive loss of privacy as the boundary between work and home gets blurred. This makes the employees feel they have lesser autonomy at work and less control over the situation, thus feeling threatened and losing their efficiency (Tarafdar et al. 2010; Weil & Rosen 1997). Moreover, constant connectivity will also compel them to focus on current operational tasks. Hence, employees may not have free time for creative thinking and innovation. Thus,

H1b: Techno-invasion is negatively associated with employee innovation.

Techno-complexity, the third technostress creator intimidates the employees due to the time and effort required to learn how to use new ICT. They also need to cope up with systems crashes, data getting lost and lack of technical help at all times, threatening the employees of lesser control over the technology and work. Such a complexity will also result in the employees spending a lot of time learning about the new features and other unexpected disruptions. Because of this, employees may have lesser time and also the wish to explore new innovative applications of ICT that could perhaps

be developed and used (Nelson & Kletke 1990; Tarafdar et al. 2010). Further, employees may be demotivated because of the experienced frustration leading to less innovative inputs. Hence,

H1c: Techno-complexity is negatively associated with employee innovation.

Techno-insecurity, the fourth dimension of technostress creator, stresses the employees as they fear the possibility of losing their jobs, in case of their inability to cope with the learning requirements and work process adaptations (Tarafdar et al. 2007; Tarafdar et al. 2010). They are threatened due to the lack of control which the technology imposes, diminishing their satisfaction level and consequently limiting their efficiency and effectiveness. This will compel employees to do their routine tasks using ICT rather use it for new and innovative tasks. Hence we hypothesize,

H1d: Techno-insecurity is negatively associated with employee innovation.

Techno-uncertainity, the final dimension of technostressor, stresses the employees due to endless upgrades and the pressure to keep current and work with new applications. This again threatens the employees, diminishing their control over work, self and technology, impacting the employees' efficiency (Chilton et al. 2005; Tarafdar et al. 2007). This uncertainty may force employees to look at the most important current things that they could do using with ICT rather than use if for innovative initiatives. Thus we have,

H1e: Techno-uncertainty is negatively associated with employee innovation.

Further to the linear relationships hypothesized above which are usually for the sustained long term effect of technostress creators, we also need to examine how the relationship between technostress creators and employee innovation performance varies with the levels of stress creators? We expect that the relationship between technostress creators and innovation performance to follow the Inverted-U model (also known as the Yerkes-Dodson Law) (Yerkes & Dodson 1908). According to the Yerkes-Dodson Law, there is a subtle relationship between stress and employee outcomes (such as innovation) such that the individuals experience the right amount of stress, they do their best work. However, if there's too much or too little pressure, their outcomes can suffer (see Anderson et al. 1989; Lupien et al. 2007). This is because, though they perceive threat due diminished control over work, self and technology due to technostressors, yet, they also see opportunity that the technology is offering. For example, though *techno-overload* threatens the employees due to information overload and IT-enabled multi-tasking, yet, they appraise the overload of IT as an opportunity to have enhanced control over work and other colleagues till a sustainable level of stressor (Beaudry & Pinsonneault 2005; Lazarus & Folkman 1984). Similarly, *techno-invasion* will overwhelm the employees with work and they will never feel free from work. However, at the same time, employees might perceive techno-invasion as an opportunity to be not bounded by time and space to complete their work. This flexibility results in better control which can eventually increase their efficiency and effectiveness till a certain level of stressors. *Techno-complexity* will intimidate the employees to learn and use IT. This will compel them to strive for better control towards oneself (by seeking training), better control over technologies (by changing the features of IT) and improved control over task (by adjusting work procedures for a better task-technology fit) (Beaudry & Pinsonneault 2005; Lazarus & Folkman 1984) resulting in enhanced employee innovativeness till a reasonable level of technostressors. Similarly, for *techno-insecurity* which causes the feelings of insecurity in the face of unfamiliar IT, as the familiarity of the employees with the IT increases, they will feel better control over task and technology, resulting in enhanced employee innovativeness till a certain limit of stressor. However, the final technostress creator of *techno-uncertainty* will result in an unsettled feeling for the employees and thus they are threatened due to continual IT changes resulting in lack of control over task, self and technology at all times – even at low levels of techno-uncertainty. This lack of control at all levels of techno-uncertainty will distress the employees due to which curvilinear relationship between techno-uncertainty and employee innovativeness is unlikely (Le Fevre et al. 2003). Consequently, based on the discussion above we hypothesize together for all the five technostress creators,

H2a: Higher levels of the techno-overload will exhibit a curvilinear relationship (inverted U shaped relationship) with employee innovation, such that higher techno-overload increases the innovativeness to a certain point, but then decreases the employee innovation thereafter.

H2b: Higher levels of the techno-invasion will exhibit a curvilinear relationship (inverted U shaped relationship) with employee innovation, such that higher techno-overload increases the innovativeness to a certain point, but then decreases the employee innovation thereafter.

H2c: Higher levels of the techno-complexity will exhibit a curvilinear relationship (inverted U shaped relationship) with employee innovation, such that higher techno-complexity increases the innovativeness to a certain point, but then decreases the employee innovation thereafter.

H2d: Higher levels of the techno-insecurity will exhibit a curvilinear relationship (inverted U shaped relationship) with employee innovativeness, such that higher techno-insecurity increases the innovativeness to a certain point, but then decreases the employee innovativeness thereafter.

H2e: Higher levels of the techno- uncertainty will not exhibit a curvilinear relationship with employee innovativeness.

4. PROPOSED METHODOLOGY AND FUTURE WORK

We are using a survey method for testing the proposed hypotheses. Validated scales from existing literature were adapted to the research context to formulate the questionnaire. To measure the items, we used a 7-point Likert scale. Questionnaires so formulated were distributed to senior-level organizational managers who regularly use ICTs to accomplish their professional tasks. We sent email invitations to nearly 700 senior managers to participate in the study survey. The initial mailing list was prepared using executive program alumni lists from two leading business schools, one in Europe and the other in Asia. Further, invitations were also sent to senior executives from several large corporations who agreed to participate in the study. An online link to the survey was attached to the email invitation, along with a letter which informed the participants of the voluntary nature of survey participation and assured them of confidentiality. A follow-up reminder was sent a week later. Initial analysis with the collected data shows that the data has satisfactory factor structure and psychometric properties. We intend to do the detailed analysis to test the proposed hypotheses within the next few weeks and believe that we should have the final results ready for presentation at PACIS 2015 conference.

5. EXPECTED CONTRIBUTIONS

This research-in-progress paper is expected to make two major contributions. First, though past studies have described technostress creators through five dimensions which include *techno-overload, techno-invasion, techno-complexity, techno-insecurity* and *techno-uncertainty*, the individual impact of each dimension of technostress creators on job outcomes is largely unexplored. In this research, we theorize and test the relationship of each of the individual technostress creators with the employee innovation performance rather than treating 'technostress creators' as one aggregated construct. This contributes to deeper theoretical understanding about the nature of individual technostress creators. Second, though the past research on stress and coping suggests an inverted U-shaped relationship between stress and job outcomes as demonstrated through the Yerkes-Dodson Law, this relationship has not been examined for the technostress context. In this study, using TMSC as the guiding theoretical framework we hypothesize the quadratic relationships of individual technostress creators with innovation performance. This will again help in a more nuanced understanding of the nature of

different technostress creators, thereby stimulating future research on the topic. On the practical front, the results of the study will be useful for organizations for designing appropriate managerial interventions taking into account the role of technostress creators in influencing employee innovation.

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