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ABSTRACT

While recent research has studied Information Technology (IT) as a job stressor, others have proposed IT to be a means to reduce the impacts of job stressors by facilitating communication and coordination, by providing information for better decision making, and by encouraging faithful appropriation. This research proposes both the stress inducing and stress relieving roles that IT might play on employee burnout, job satisfaction, and turnover. Following the job demands-resources model, this research posit that job resources such as IT communication, IT information and IT appropriation support may play a role in mitigating employees' job stress. We further theorize the moderating role of these job resources on the relationships between other job stressors and burnout. The proposed model provides researchers a holistic view to understand the net effect IT can have on employees by considering *simultaneously* both the stress inducing and stress relieving component of IT.

Keywords

Technostress, Job Demands-Resources Model, Technology Job Resources, Turnover intention

INTRODUCTION

A plethora of research has investigated the effect of job stress on employee performance. Recent years have witnessed the appearance of several interesting studies on stress due to new information technologies (IT). Unlike yesteryears, technology today is deeply embedded in workers day-to-day activities and has ubiquitously invaded the work life of workers beyond that which has been traditionally studied (Tarafdar et al., 2007). The concept of technostress has established the importance of stress due to IT and has become a popular buzzword in stress and IS (Information Systems) literature. However, organizational behavior researchers pay scant attention to stress due to IT, while the IS researchers have limited the boundary of research to stress due to IT (Ayyagari et al., 2011; Ragu-Nathan et al., 2008; Tarafdar et al., 2007; Tarafdar et al., 2010). Therefore, research on technostress may have limited the predictability of stress on workers. Curiously, despite of the rise of technostress studies, few have attempted to combine stress due to IT and stress due to job characteristics. Hence, to obtain a more holistic view and to continue advancing knowledge on technostress in workplace, the first objective of this study is to explore simultaneously the effects of stress due to both IT and innate job characteristics.

The job demands-resources model, a widely used model in stress literature provides several risk factors associated with job stress. These factors can be classified in two categories: job demands and job resources (Bakker et al., 2010; Demerouti et al., 2001). Job demands refer to physical, psychological, social and organizational aspects of the job that require an effort by the employee, while job resources refer to the same aspects as demands, but are intended to facilitate the attainment of work goals, to stimulate personal growth or to reduce job demands (Bakker et al., 2004). Consistent with the concept of job resources of this model, in IS literature, Beaudry and Pinsonneault (2010) suggest that organizational resources can reduce employees' negative emotions which evoke stress during the implementation and use of new IT. For example, in technostress literature, Ragu-Nathan et al. (2008) provide empirical evidence that organizational mechanisms such as literacy facilitation,

technical support provision, and involvement facilitation can reduce the effect of stress due to IT use. However, the IT-triggered job resources which can reduce employees' stress is often noted but rarely studied in the technostress literature. Although a new IT is likely to be mentally fatiguing and frustrating, resources gained through IT like social network in the workplace are expected to reduce employee's stress and enhance the positive emotions to IT (Sykes et al., 2009). Thus, with the intent of enhancing an understanding of technostress in workplace, the second aim of this study is to investigate the effects of IT-triggered job resources in reducing technostress.

In summary, analyzing prior technostress studies reveals that there is (1) absence of synthesizing the characteristics of job with IT as a source of stress; and (2) absence of considering the stress-reducing effects of IT. Specifically, the objectives of this paper are to (1) develop a model of technostress based on job demands-resources model (JDR model); and (2) use the model to understand how IT can mitigate the effects of stressors on employees.

In the following section, we briefly explain and discuss our theoretical background. We then propose our research model and develop testable propositions based on the model. Potential implications for future research and practice are discussed.

THEORETICAL FRAMEWORK

With a rapid introduction and ubiquity of IT in the workplace, four recent studies have emphasized the importance of technostress in organizational contexts (Ayyagari et al., 2011; Ragu-Nathan et al., 2008; Tarafdar et al., 2007; Tarafdar et al., 2010). However, there has not been an integrative model for technostress in IS literature which combines both the stress inducing and stress reducing mechanisms due to IT. Reviewing the literature with regard to job-stress, this paper aims to develop a comprehensive model using the JDR model (Demerouti et al., 2001), which combines job demands (factors related to stress-creating mechanisms) with job resources (factors related to stress-reducing mechanisms). To justify the prompt selection of JDR model as our principal theory foundation, we shall start by summarizing the theoretical paradigms in the job-stress literature.

Job demands-resources model

Three important models in work stress research are (Bakker and Demerouti, 2007; Van Vegchel et al., 2005): (1) the job demand-control (JDC) model (Karasek, 1979), (2) the effort-reward imbalance (ERI) model (Siegrist, 1996; Siegrist et al., 1986); and (3) the job demands-resources (JDR) model (Demerouti et al., 2001; Xanthopoulou et al., 2007).

The JDC model predicts that two dimensions of job characteristics affect the level of job strain (e.g. burnout) in an employee. These include job demands and job control (Karasek, 1979). Job demands are defined as "*the physical, social, or organizational aspects of the job that require sustained physical and mental effort and are therefore associated with certain physiological and psychological costs*."(Demerouti et al., 2001) Job control refers to "the extent to which *a person is capable of controlling their tasks and general work activity*." (Hausser et al., 2010)The ERI model focuses on job rewards rather than job controls (Siegrist, 1996). The ERI model assumes that an imbalance between efforts and rewards results in job strain and a deficiency of reciprocity between them leads to job stress (Bakker and Demerouti, 2007). Recently, in a similar vein with JDC model, Demerouti et al. (2001) developed the JDR model that classifies job characteristics into two dimensions, namely job demands and job resources. Job resources refer to those " *physical, psychological, social, or organizational aspects of the job that are (1) functional in achieving work goals; (2) reduce job demands and the associated physiological and psychological costs; and (3) stimulate personal growth, learning, and development."* (Bakker et al., 2004; Schaufeli and Bakker, 2004). The JDR model interrelates many possible working conditions into these two dimensions, and emphasizes both their negative and positive consequences.

Both JDC model and ERI model argue that job strain stems from job demands. In dealing with this issue, although their strength lies in their simplicity, these models have a weakness which this simplicity does no justice to (Bakker and Demerouti, 2007). Both models are static i.e. while the JDC model regards job autonomy as the most important job resource, the ERI model regards rewards as the most important resource for employees. Furthermore, these models do not give clear evidence as to why job resources are incorporated in the model and why one job resource is more important than other job resources. Thus, these models leave little room for the induction of other factors that may be related to job stress (Bakker and Demerouti, 2007).

In conjunction with these problems, JDR model gives some feasible solutions that may help researchers cope with the deficiency of previous studies. The first point of JDR model is that although employees in different organizations may be faced with different working environments, the characteristics of these environments can always be classified in two general

categories: job demands and job resources (Demerouti et al., 2001). Regardless of the specific job demands and resources involved, this model could be utilized in various occupational settings (Bakker et al., 2003). The second premise of JDR model is that job resources may be located at the level of the organization (e.g. pay, career opportunities, job security), at the interpersonal and social relations level (e.g. supervisor and co-worker support, team climate), the organization of work (e.g. role clarity, participation in decision making), or at the level of the task (e.g. skill variety, task identity, task significance, autonomy, performance feedback) (Bakker and Demerouti, 2007). In this study we will focus on the dual role of IT as a job demand and a job resource. While recent IS literature has spawned studies relating to the impact of technostress on individual performance, there are few studies that have regarded IT as a job resource. From our literature review, we propose three job resources related to IT: IT communication support, IT information support and IT Appropriation support. The JDR model posit that job resources increase an individual's motivation to devote him/herself to work which in turn increases work engagement and job satisfaction (Demerouti et al., 2001). Following this premise, IT may play motivational roles to workers because they are functional in (1) achieving work goals through IT information support; (2) reducing job demands and the associated physiological and psychological costs through IT communication support; and (3) fostering personal learning of technology usage through IT appropriation support (Bakker et al., 2004; Schaufeli and Bakker, 2004)..

RESEARCH MODEL AND PROPOSITIONS

The conceptual model in Figure 1 helps to illustrate how IT simultaneously affects employees both negatively and positively.
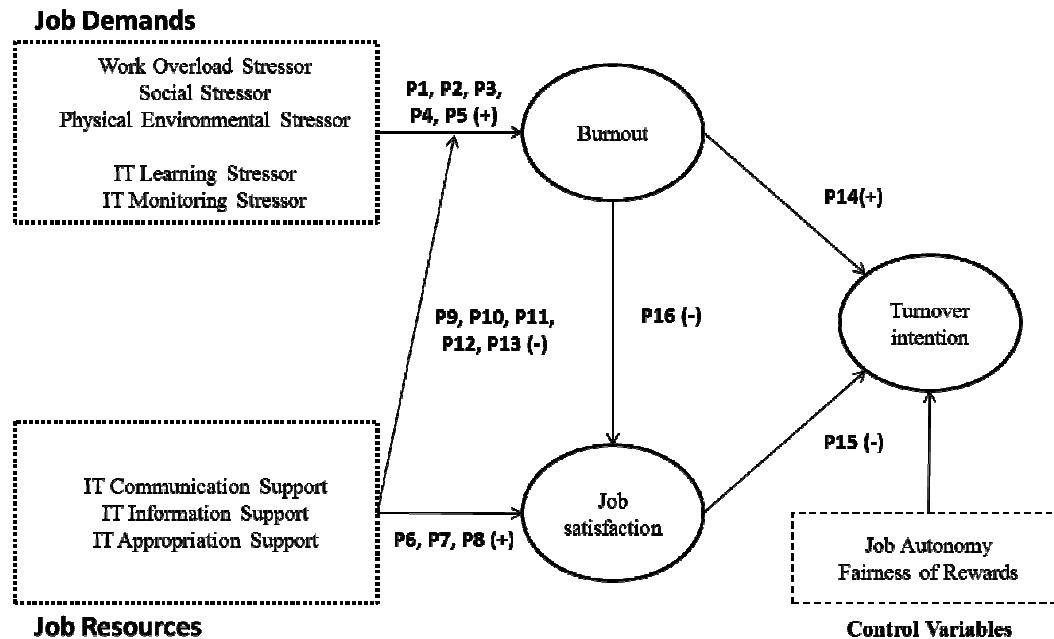

Figure 1. Conceptual Model

Job Demands and Burnout

As has been noted earlier above, JDR model posit that job demands may induce employees' burnout (Demerouti et al., 2001). They include work load demands, physical environment demands and social demands (de Croon et al., 2003). In this study, burnout refers to "the depletion of mental resources" (Moore, 2000).

Work overload stressor refers to conditions under which individuals are required to do more than they are able because of time limitation available for performance (Shaw and Weekly. 1985). Most studies examining the positive effect of work overload on burnout give empirical evidences that heavy workload translates into higher job demand leading to elevated stress and reduced efficiency (Glaser et al, 1999). Thus, we propose

Proposition 1: Work overload stressor is positively related to burnout.

Social stressor includes the pressure placed on an employee due to the interactions in social and professional work relationships. These include interactions with co-workers, supervisors, and clients that the worker has to interact with during his/her job. Many jobs require regular contact with other people at work. Poor or unsupportive relationships, lack of respect, unfair treatment and isolation from colleagues and/or supervisors can be a potential source of stress (Maslach and Jackson, 1982; Gaines and Jermier 1983). Research on occupational stress proposes that such kind of negative experience may lead to distress and frustration, hence causing burnout (Leiter and Maslach, 1988). Thus, we propose

Proposition 2: Social stressor is positively related to burnout.

Physical environment stressor is the physical characteristics of the job environment that may evoke stress in an individual e.g. bad illumination, noise, etc. Because such variables have the capability to interfere with optimum human functioning, they may affect the worker both physiologically and psychologically, thus inducing burnout, and eventually reducing job performance (Evans and Cohen, 1984) and job satisfaction (Judge et al 2001). Thus we propose,

Proposition 3: Physical environment stressor is positively related to burnout.

Our study extends the literature by including IT learning stressor and IT monitoring stressor as two additional job demands that are induced due to certain characteristics of IT. (Ayyagari et al., 2011)

IT learning stressor refers to the stress associated with learning how to use technologies that have saturated today's workplace e.g. web, social or professional networks and personal communication devices. They result from those characteristics of IT that negatively affect the worker's ability to work because of its complexity, hassle involved in its operation or its ability to produce information that is difficult for the user to consume (Ragu-Nathan et al, 2008). These demands also include stress experienced by workers due to constant updating and learning of new skills in order to keep up with the changing technologies at workplace. Ragu-Nathan et al (2008) argued that such characteristics of technology may stress workers because they feel inadequate with regard to their computer skills and thus forces them to spend time and effort in learning and understanding technologies. Thus we propose

Proposition 4: IT learning stressor is positively related to burnout.

Recent technological advances provide organizations with the ability to monitor employee performance more frequently and at a more microscopic level than was previously possible. However such technologies also have an adverse effect on employees. *IT monitoring stressor* refers to the stress experienced by individuals due to the obtrusive nature of technology. Such stressors result from characteristics of technology that make the individuals feel that their privacy is invaded and they have low job autonomy. Ayyagari et al (2011) proposed presenteeism and anonymity as two intrusive characteristics of technology leading to employee stress. Research on electronic monitoring provides evidence that workers experience more stress when employees are electronically monitored than when they are not monitored (Amick & Smith, 1992; Rogers, Smith, & Sainfort, 1990; Irving et al, 1986). One study compared the survey responses of 762 monitored and non-monitored telecommunications workers, and found significantly higher levels of tension, anxiety, depression and anger (psychological demands, and fatigue (physiological demand) among respondents working in a monitored organization (Smith, Carayon, Sanders, Lim, & LeGrande, 1992). Constant electronic surveillance can also lead to stress due to constant fear of losing the job. Over time such emotions can decrease intrinsic motivation of a worker thus leading to burnout. Thus, we propose

Proposition 5: IT monitoring stressor is positively related to burnout.

Job Resources and Job Satisfaction

As has been noted earlier above, JDR model posit that job resources increase an individual's motivation to devote him/herself to work which in turn increases work engagement and job satisfaction (Demerouti et al., 2001). Following this premise, job resources may play motivational roles to workers because they are functional in (1) achieving work goals through IT information support; (2) reducing job demands and the associated physiological and psychological costs through IT communication support; and (3) fostering personal learning of how to use IT through IT appropriation support (Bakker et al., 2004; Schaufeli and Bakker, 2004).. IT communication support can be defined as any aspect of IT that supports, enhances, or defines the capability of a worker to communicate and co-ordinate with others (Dennis et al., 2001). It includes such elements as parallelism, anonymity and feedback (Dennis et al., 2001). IT Information support is the capability of IT to gather, share, aggregate, structure, or evaluate information. This kind of support includes conditions in which IT informs the worker to make better choices and decisions thus reducing task related uncertainties. Lastly, IT appropriation support refers to the technology's capability to guide users to use the technology in a way the designer intended to (Dennis et al., 2001).

Contrary to the role of IT as a stressor, some researchers have proposed that IT can be a means to simplify, improve and enrich jobs by facilitating communication, collaboration and coordination, by providing information for better decision making and by facilitating the proper use of the technology (Kim and Lee, 2011; Ransbotham and Kane, 2011). Such advancements in technology have led to improvements in worker productivity and the efficiency. Furthermore, the design of technology has also evolved to be more intuitive thus relieving the user with the cognitive load of understanding and using the technology. This helps workers accomplish their task faster and more efficiently thus leading to job satisfaction. Therefore, we propose

Proposition 6: IT Communication support is positively related to job satisfaction.

Proposition 7: IT Information support is positively related to job satisfaction.

Proposition 8: IT Appropriation support is positively related to job satisfaction.

The Interaction Effects between Job Demands and Job Resources

Another main proposition in the JDR model is that the interaction between job demands and job resources is important for the development of burnout (Bakker et al., 2003; Knudsen et al., 2009). JDR model posit that job resources may buffer the impact of job demands on job strain, including burnout. Many studies have provided an empirical evidence for the buffer hypothesis of the JDR model. For example, Xanthopoulou et al. (2007) showed that the negative influences of job demands on burnout was less when employees had access to social support, opportunities for development and job control. The IS literature on technostress has so far used organizational mechanisms such as IT support, literacy and involvement facilitation (Ragu-Nathan et al., 2008) and appropriate training (Dennis et al., 2001) as buffers in the stressor-strain relationship. However, very little research has looked at the capabilities of IT to buffer the stress impacts on burnout.

It should also be noted that job resources may only buffer the undesirable effect of job demands when the characteristics of job resources and job demands 'fit' (Stroppa and Spieß, 2010). Although this assumption is consistent with JDC model, the reason why job resources can act as buffers is different for different resources (Bakker and Demerouti, 2007). In other words, several different job resources can play the role of buffer for several different job demands for different reasons. Consistent with this fit hypothesis, we posit that IT communication support, IT information support and IT appropriation support may have the potential to buffer different job demands-burnout relationships in different ways as discussed next.

The conceptualization of IT as a job resources is consistent with the general perception of social support in the stress literature from an effort-recovery perspective which assumes that employees who get more job resources experience weaker negative effects of job demands on burnout relative to those who have less job resources (Beehr et al., 2003). Specifically, IT communication support will be committed to overcoming the barriers of social stressors through helping to make and maintain other social relationships that may help to minimize the impact of loss, deficiency or decline in the task-related relationships (Zettel and Rook, 2004). For example, proper social support provided by Facebook friends may affect user's happiness positively (Kim and Lee, 2011). Facilitated by IT communication support, employees may have *"a sense of identity and belonging, positive self-image, and a sense of control over the stressful situation"* (Nahum-Shani and Bamberger, 2011). When IT communication support is salient, employees are more likely to promote their coping capabilities to mitigate the impacts of social stressor on burnout. Thus, we propose

Proposition 9: IT Communication support negatively moderates the relationship between social stressor and burnout.

IT information support enables employees to get the context-related information needed to complete their job. Getting job-related information at proper time and/or place helps employees not only conduct their task easily but also increase the efficiency of their work. Such a tangible support will reduce the cognitive and physical work load of employees. Therefore, it can be assumed that the more IT information support employees have, the less likely employees will perceive their job as stressful. Furthermore, IT has the capability to informate employees on how to avoid or be prepared to manage environmental stressors (e.g. a GPS system can inform a driver about alternative routes in case of traffic congestion). Therefore, when IT information support is salient, employees are more likely to promote their coping capabilities to mitigate the impacts of both workload stressors and physical environment stressors on burnout (Nahum-Shani and Bamberger, 2011). Thus, we propose

Proposition 10: IT Information support negatively moderates the relationship between work overload stressor and burnout.

Proposition11: IT Information support negatively moderates the relationship between physical environment stressor and burnout.

Whether IT monitoring may evoke employees' stress or not has yielded equivocal results in the organizational behavior literature (Sewell and Barker, 2006). Research on IT monitoring has followed two streams: a radical discourse that focuses on technology's coercive behavior on employee and a liberal discourse that focuses on technology's caring behavior on employees (Sewell and Barker, 2006). The coercive perspective argues that IT monitoring can impair employees' performance by creating stress and a negative stimulus that motivates users to avoid it (Liang and Xue, 2009). The caring perspective, on the other hand, focuses on practical aspects of IT monitoring, such as its fairness, effective security against organizational threats, security of intellectual property, legal protection from organizational misbehavior and promotion of desirable behavior (Sewell and Barker, 2006). We posit that when IT is capable of providing information to employees that is in their own self-interest, employees are more likely to perceive monitoring as fair and useful. Therefore the positive relationship between IT monitoring stressor and burnout should be weaker when IT information support is high, because IT information support mitigates the negative perception of IT monitoring when integrated with the positive attitude of employees to IT monitoring. Thus, we propose

Proposition 12: IT Information support negatively moderates the relationship between IT monitoring stressor and burnout.

As follows from the definition of IT appropriation support in this study, it is related to IT learning stressor which is associated with the concept of ease of use or complexity of IT (Ayyagari et al., 2011). Previous research has showed that technology can be designed in a way that facilitates users' faithful appropriation. In other words, when IT is designed and built to contain features and functions that help users use and learn it, then technology is more likely to be used as the designers intended it to. Consequently, IT appropriation support will be able to compensate for the stress associated with IT learning stressors. Hence, when IT appropriation support is salient, employees are more likely to promote their coping capabilities to mitigate the impacts of IT learning stressor on burnout. Thus, we propose

Proposition 13: IT Appropriation support negatively moderates the relationship between IT learning stressor and burnout.

The antecedents of turnover intention

Turnover intention is defined as a voluntary intention of employees to quit their organizations (Ahuja et al., 2007; Knudsen et al., 2009; Moore, 2000). Majority of studies investigating the influence of strain on turnover have demonstrated that employees with high level of strain are more likely to voluntarily quit from their jobs than employees with low strain levels. For example, Ahuja et al. (2007) showed that work exhaustion predicted subsequent turnover positively in the context of IT professionals. Thus, we propose

P14: Burnout is positively related to turnover intention.

The relationship between job satisfaction and turnover intention has been studied by many researchers. A review of the literature on the relationship between employee turnover and job satisfaction has reported a consistent negative relationship between the constructs (Jason Bennett et al., 2002; Mobley et al., 1979). Higher job satisfaction is generally believed to be associated with increased productivity, lower absenteeism, and lower employee turnover (Mobley et al., 1979). Job satisfaction is also affected negatively by burnout. High levels of burnout may reduce employees' organizational commitment (Ahuja et al., 2007) and consequently, reduce their job satisfaction. Thus, we propose

P15: Job satisfaction is negatively related to turnover intention.

P16: Burnout is negatively related to job satisfaction.

Control variables: Innate job resources

To minimize omitted variable bias, we use two job characteristics, job autonomy and fairness of rewards, to control for the effects of external factors while testing for the main effect of job demands and job resources due to IT . Job autonomy negatively influences turnover intention, the assumption being that high job autonomy would lead to better performance, intrinsic motivation to learn, and help employees cope with the strain effects such as turnover intention (Karasek and Theorell, 1990). Fairness of rewards is the degree to which an employee perceives he/she is fairly and reciprocally receiving benefits from his/her firm. The lack of fairness of rewards has been empirically seen to negatively influence organizational commitment and turnover intention (Ahuja et al., 2007).

Implications for Research and Practice

While this paper has explored some of the competing roles of IT that are related to job stress, it is significant to raise new research questions and bring managerial implications of the model to light.

This study explicitly identifies IT's capability in reducing stress, thereby significantly extending the present understanding of technostress (Ragu-Nathan et al. 2008; Tarafdar et al. 2007). Rather than solely considering the stress inducing effects of IT on individuals, we can now describe stress relieving effects of IT and through what mechanism IT would reduce stress. The proposed model also provides researchers with the ability to understand the net effect IT can have on an individual by considering *simultaneously* both the stress inducing and stress relieving component of IT. Rather than just asking "What are the dominant IT stressors?" it is also important to ask "Can we influence the manifestation of stress through IT and if so, how?" (Ayaggari et al 2011). In future, new technologies could be evaluated on their potential to reduce stress and this could be identified even before these technologies are fully implemented and utilized.

Most researchers have studied technostress using a research sample that can be generalized to white collar individuals working in an office environment. Since our proposed conceptual model possesses the benefit of being generalizable to any work environment, future research should examine the validity and extend the generalizability to other contexts like blue collar jobs which are seldom studied in IS research. We believe that our model is not constrained to any particular occupation; in fact, it is developed to understand the impacts of IT across different occupations in an organization.

Managers could use the proposed model as a diagnostic tool to assess the stressful and stress relieving impacts of technologies that are commonly used in an organization. The model also helps managers with identifying the extent to which IT related stressors are as important as other well recognized stressors such as workload, social, and physical environmental factors. This would help managers develop effective interventions and management strategies to relieve IT pressure thus reducing costs associated with replacing stressed individuals in organizations.

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