Impact of Technostress on Job Satisfaction and Organizational Commitment

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Abstract

Due to the fast development of ICT technology, both our private and professional lives have changed fundamentally. By using mobile computing communication devices and computer networks, people have the ability to access information quickly; real-time information sharing with colleagues that can happen anytime and anywhere. Thus employees may feel forced to be always connected and respond to work-related issues at any time, and so lose the control of their personal lives. With the adoption of ICTs, organizations are taking on the pressures of frequent re-engineering and process changes, driven by the ICT changes and upgrades. Although the evolution of ICTs has brought numerous potential benefits to the organization, employees often feel frustrated and distressed when they are not able to cope with the demands of organizational computer usage. Recent literature has named this technology-related stress "technostress".

The primary objective of the present study is to develop and validate a model that analyzes the effects of factors that create technostress, and examines its relationship with job satisfaction and organizational commitment. In addition, this study also attempts to identify a mechanism that can potentially alleviate the negative effects of technostress. It examines how user involvement as a technostress inhibitor affects technostress, job satisfaction and organizational outcomes.

The result is based on a survey data analysis of 215 people who work in New Zealand . A structural equation modeling technique was applied to examine the simultaneous casual relationships between technostress creators and other variables, and further, to explain them Results from the present study found that technostress is a significant factor in predicting employee job satisfaction, which in turn impacts on their organizational commitment. It also provides evidence for the mediating effect of job satisfaction in the relationship between stress and organizational commitment. In addition, this study highlights the complex nature of user involvement and its complex relationship with other organizational and individual factors.

The technology world will continue to advance; organizations will continually introduce new technology to keep up with competition in the market, and employees cannot avoid continually increasing their daily interactions with ICTs. This study demonstrates potential negative effects of technostress for ICT usage in organizations. The results of the study suggest that technostress is an important factor in predicting the job satisfaction of employees, which in turn influences their commitment to the organization.

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1 Introduction

1.1 Background of the Study

The term "information and communication technology" (ICT) is the combination of computer, telecommunication and media technologies (Bradley, 2000). Due to accelerated technology development, both our professional lives and private lives have been changed fundamentally (Hoffman, Novak, & Venkatesh, 2004). Advanced ICTs, such as the Internet, mobile communication and wireless technologies, have become essential in many aspects of our daily lives (Wang, Shu, & Tu, 2008). ICTs potentially enable people to be connected anywhere and anytime. By adopting ICTs, organizations have undertaken changes in several aspects, including organizational structure and behaviour, business process and altered means of interaction among employees and between individuals and the organization (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Qiang, 2008). This has resulted in some significant benefits for the organization in terms of operational cost reduction, labour saving, better process efficiency and higher work productivity (Dos Santos & Sussman, 2000).

However, a growing number of research studies have indicated the negative aspects of the technology advance (Fisher & Wesolkowski, 1999; Heinssen, Glass, & Knight, 1987). Along with the obvious business benefits, ICT could also generate negative individual reactions and require employees to adjust in various ways (Tarafdar, Tu, Ragu-Nathan, S., & S., 2007). For example, employees may have to constantly update their technical skills and adapt to more complicated systems in order to keep up with the advancing fast pace of ICTs. These requirements may result in employees generating negative cognitions toward ICTs (Heinssen et al., 1987). Previous organizational behaviour research has described these reactions; such as, anxiety and tension (Heinssen et al., 1987), job dissatisfaction (Smith, Cohen, Stammerjohn, & Happ, 1981) and perceived high work pressure (Ragu-Nathan, et al., 2008).

More generally, the uses of ICTs appear to be creating stress in some individuals. This phenomenon is known as “technostress”. Such stress is experienced by individuals who are unable to cope with the demands of organizational ICT usage (Tarafdar, Tu, & Ragu-Nathan, 2010). First, employees are always connected by email, phone and the Internet. Individuals may feel they are always “on call” and lose the control of their own time and space, and it always creates “urgency” (Brillhart, 2004). Such situations could possibly make employees feel stressed out. Second, employees sometimes seem to be overwhelmed by the information from different sources as part of their work (Tarafdar, Ragu-Nathan, Ragu-Nathan, & Tu, 2005). It forces them to work harder and faster to cope with the work demands. Third, the introduction of new technology or systems often comes with organizational downsizing. Employees feel threatened about being replaced by complex ICTs (Bradley, 2000). All of the above situations could potentially reduce an employee’s confidence and overall satisfaction about their ICT usage. They then may start to feel insecure and develop an aversion to using the new system. In the meantime, it pushes employees to constantly renew their skills under pressure from the complicated system (Bradley, 2000; Tarafdar, et al., 2010).

The current organizational development trend necessitates an increase in the level of user dependence on ICTs (Tarafdar, et al., 2010). Employees may have to continually increase their daily interactions with ICTs, which may worsen the potential negative effects of ICT usage on individuals. Therefore, it is critical for employees to be satisfied with the system they work on and capable of effectively using it to fulfill their work, and to utilize the system to enhance work productivity (Huang, Yang, Jin, & Chiu, 2004). Previous researchers have suggested that technostress can lead to decreased job satisfaction towards technology, poor performance, disruptive behaviour, low commitment and an intention to leave the workplace (Qiang, Kanliang, & Qin, 2005). It is very important to understand the phenomenon of technostress and its negative effects at the individual level, as well as its organizational outcomes.

Further, it is important to investigate how to mitigate the negative effects of technostress in order to improve organizational outcomes, as research shows again and again that organizations with satisfied employees are more productive. Ostroff (1992), for example, suggested that organizations with more satisfied employees are more productive and profitable than those with less satisfied employees. Satisfied employees tend to be more engaged in collaborative efforts and more likely to accept organizational goals, which can further increase their work productivity (Ostroff, 1992). Highly satisfied employees are more likely to meet or exceed organizational expectations (Moser & Galais, 2007). An early study from Locke (1970) also found that employees judge their job value according to several factors, such as control of their own work pace and method, and the opportunity to exercise their skills and abilities. Therefore, employees are more likely to be satisfied with their job and improve their work efficiency when they know what is expected from them and have the right tools and knowledge to perform the work. A study by Schneider & Schmitt (1986) argued that "satisfaction-performance relationship at the organizational level may be stronger than the relationship at the individual level". And, according to Trist (1978), organizational productivity relies on both the technical and social domains of the organization. Some of the social psychological factors, such as job satisfaction and attitude, are more important than others (Ostroff, 1992). In order to achieve high performance, the organization should not only focus on the development of the technical system, but also consider the emotional states of its employees.

1.2 Statement of the Problem

The present working environment continues to change, largely due to the increasing use of ICTs (Ayyagari, Grover, & Purvis, 2011). Increasingly concerns have risen in regard to how to manage these changes. Therefore, understanding ICT-related stress and its effects on individuals is becoming an important area in organizational behaviour studies. For example, previous research has focused on the individual stress experiences in terms of information systems (Ivancevich, Napier, & Wetherbe, 1983;

Sethi, King, & Quick, 2004). Other studies have discussed the individual anxiety felt when employees try to cope with unfamiliar ICTs and the new working habits associated with fast developing ICTs (Brillhart, 2004; Matteson & Ivancevich, 1987; Nelson & Kletke, 1990). However, it is argued that there needs to be greater focus on systematically investigating the stress-creating factors of ICTs and their effects on individuals in organizational environment (Tarafdar, Tu, Ragu-Nathan et al., 2007).

1.3 Purpose of the Study

The first objective of this research is to develop a technostress model in order to understand stress in today's technology environment. And, further to systematically investigate the technostress phenomenon and its potential negative impacts on organizational effectiveness. Irrespective of the type and nature of an organization, its performance and effectiveness are largely dependent on the job performance of the individual employee (Tarafdar et al., 2010).

Job satisfaction and organizational commitment of employees tends to be positively related to their job performance. (Qureshi, Hayat, Ali, & Sarwat, 2011). Job satisfaction, as one of the valued outcomes of an organization, has played a critical role in considering the effectiveness of an employee's performance (Shaikh, Bhutto, & Maitlo, 2012). The relationship between job satisfaction and job performance has been explained and presented by many theories, such as the social cognitive theory which explains that the "attitude of the employees towards their job also affects the behaviour of their job" (Fisher, 2003; Shaikh et al., 2012). Organizational commitment as one of the broader organizational outcomes has been considered as a psychological outcome of organizational situations (Glazer & Kruse, 2008). It has been defined as the feelings of responsibility that employees have towards to the mission of the organization (Qureshi, et al., 2011). Highly committed employees usually desire to remain in the particular organization, and are willing to make high-level efforts on behalf of the organization in order to help the organization succeed (Allen & Meyer, 1990; Jamal, 1985).

The second objective of this research is to identify a mechanism that can potentially alleviate the negative effects of technostress. This study also examines whether 'user involvement' can act as a technostress inhibitor, to reduce the negative impacts of technostress creators on job satisfaction. This model is developed based on a recent technostress study by Tarafdar et al. (2010). Tarafdar et al (2010) surveyed 233 ICT users from two public-sector organizations in the United States. Their results showed that technostress creators reduced the job satisfaction of ICT end-users and, further, decreased their job performance (Tarafdar, Tu, Ragu-Nathan, S., et al., 2007).

The goal of the present research is to further our understanding (and generalizability) of this relationship by conducting a similar study using New Zealand participants. Although New Zealand and the United States are both Western countries, they still hold different national cultures. According to Hofstede (1980), culture is defined as “collective mental programming”. People from different cultural groups, with different mental programming, will hold different values and this will lead them to frame behaviour and experience in different ways. It is therefore valuable to examine results from the New Zealand environment.

Furthermore, most of the previous research on this area use samples from one particular occupation, or one or two similar organizations (Ayyagari et al., 2011). Employees from one organization share a single, monopolistic “organizational culture” (McSweeney, 2002). This is because the organization systematically selects employees who fit the organization’s or manager’s view (Goodstein, 1981), people from a particular occupation who have the basis of similarity and share a common “occupational culture” (McSweeney, 2002). They imply that the samples are narrow and not random, in the sense that the organization and the occupation were selected. Since ICTs potentially affect everyone’s personal and professional life, to truly understand the impact of work-related ICTs on individuals, the sample frame should be considered as any individuals who use ICTs in their work. Therefore, the selection criteria for participants should not be limited to any particular occupation or organization.

1.3 Theoretical Framework

In order to test a model to study the impacts of ICT-related stress on individuals and organizations, it was necessary to intensively study previous literature on the topic.

Figure 1 shows the stress construct, which was utilized based on organizational behaviour literature. This provides the theoretical background for understanding stress in the organizational environment.

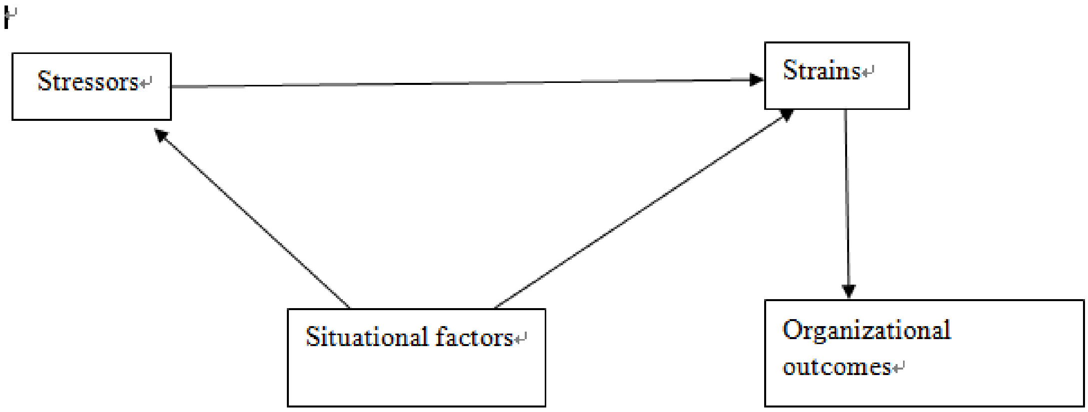

Figure 1: Transaction-based Model of Stress

This general model of stress was further developed to link the theoretical concept of organizational stress to ICT usage in the organization; and explain how the use of ICTs can potentially create stress and thus negatively impact individual job satisfaction and organizational commitment (see Figure 2). The construction of this research model utilized the work of Tarafdar et al. (2010). Their studies were based on the "Transaction-Based Model", which is the most common basis for the study on various of psychological pressure (Cooper, Dewe, & O'Driscoll, 2001; Keijsers, Schaufeli, Le Blanc, Zwerts, & Miranda, 1995).

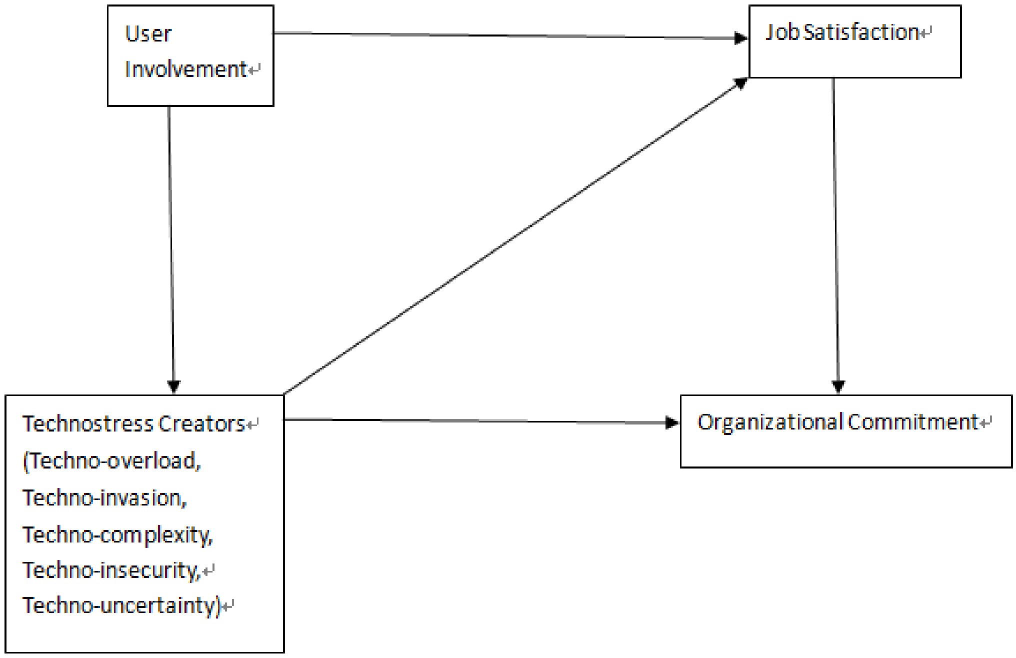

Figure 2: Conceptual Model of Technostress

As shown in Figures 1 and 2, "technostress creators" correspond to stressors, "technostress inhibitors" are the equivalents to situational variables, "job satisfaction" refers to the strain, and "organizational commitment" is considered one of the organizational outcomes. Technostress creators negatively influence job satisfaction and organizational commitment. However, user involvement, as one of the technostress inhibitors, positively influences job satisfaction and reduces the negative effects of technostress creators.

1.5 Research Focuses

The following research questions were developed to investigate the negative effects of the phenomenon of technostress in an organization and the ways to potentially alleviate such potential negative effects.

1. Does technostress negatively affect employee job satisfaction and organizational commitment?
2. Does user involvement reduce the negative impacts of technostress on job satisfaction and organizational commitment?
3. Do technostress creators determine the level of technostress?

All the specific research hypotheses will be put forward at the literature review part.

2 Literature Review

2.1 Organizational Stress

Stress-related problems contribute significantly to the individuals' health and quality of life of individuals (Tennant, 2001). Stress is primarily defined as the result of a transaction between an individual and the environment (Lazarus, 1990). It has been further defined as a "psychological reaction" to the imbalance between individual and environment (Cooper, et al., 2001). Stress exists when an individual's capability cannot meet the demands from the environment. From the organizational point of view, stress tends to lead to the consequences such as lower job satisfaction, less job involvement and poor job performance (Jackson & Schuler, 1985). The transaction-based model has been adopted for the foundation of several studies on stress (Cooper, et al., 2001; Kavanagh, 1986). As shown in Figure 1 (see section 1.4), the transaction model includes four major components: stressors, situational variables, strain and organizational outcomes.

Stressors are the factors or conditions to generate the stress (Tarafdar, et al., 2010). They can be divided into two types: role-related and task-related stressors. Role-related stressors focus on role conflict and role ambiguity (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964). Task-related stressors are conceptualized as environmental conditions or situations (McGrath, 1976), such as task difficulty and ambiguity (Ragu-Nathan et al., 2008).

Situational variables are factors that may reduce the impact of work-related stress (Jimmieson & Terry, 1998). Personal control can assist individuals to cope with stressful work situations. It is defined as the level of individuals' perceived ability to affect the changes in a desired direction (Greenberger & Strasser, 1986). In the work context, it reflects the employees' belief that they have the opportunity to adopt behavioural efforts to control the provided job-related procedures (Greenberger & Strasser, 1986). Positive work control includes role redesign, employee participation, role restructuring and social support (Davis & Gibson, 1994).

Strain refers to an individual's psychological outcomes to the stressors (Cooper, et al., 2001). The most common workplace stress includes job dissatisfaction, poor job performance, less work innovation and disruptive behaviour (Ragu-Nathan et al., 2008). Refer to figure 1 (section 1.4), generally, stressors can lead to an increase in strain, organizational mechanisms as situational variables, which can decrease the strain (Ragu-Nathan et al., 2008).

2.2 Technostress

Information and communication technologies (ICTs) swamp the daily work and personal lives of people today. The current working environment continues to change due to the increased use of ICTs (Ayyagari, et al., 2011). Employees have to make efforts to keep up with new software and hardware releases. Added to this they may also be afraid that ICTs will eventually replace humans in certain workplaces (Garland & Noyes, 2008). Individuals experience stress when they use ICTs in the working environment.

The term technostress was coined in 1984 by clinical psychologist Craig Broad (Ayyagari et al., 2011), and refers to the "negative impact on attitudes, thoughts, behaviours or body physiology that is caused either directly or indirectly by technology" (Weil & Rosen, 1997). Such stress may lead to health-related diseases, such as cardiac disease, hypertension and migraine headaches (Qiang et al., 2005). It can also cause job dissatisfaction, poor performance, disruptive behaviour and intention to leave (Qiang et al., 2005). It is a problem experienced by individuals unable to cope with the rapid change of ICTs in a healthy manner (Tarafdar et al., 2010).

ICT-related technostress, as a relatively new phenomenon of modern life, is quite different from traditionally defined stress. First, ICTs are deeply integrated into the working environment and culture. Email, video conference and smart phones make communication less reliant on face-to-face conversation (Brillhart, 2004). Flexible working schedules, the virtual team and telecommuting are becoming more common and convenient (Brillhart, 2004). However, ICT has significantly changed the conventional working style and made time and distance somewhat immaterial to the job (Ragu-Nathan et al., 2008). It has increased the possibility of remote supervision, multitasking and social isolation (Ragu-Nathan et al., 2008).

Second; technological words are changing extremely fast. New technology is constantly being introduced to the workplace, and those ICTs are becoming ever-increasingly sophisticated (Fisher & Wesolkowski, 1999). It is very common for companies to update software and hardware frequently. Many companies are under pressure to re-engineer their working processes accordingly. Employees have to spend time and make efforts to keep up to date with the new technology, which may impact on the productivity of employees (Fisher & Wesolkowski, 1999).

Third; rapid advances in ICTs have brought large amounts of information. Individuals are surrounded with information whether or not they actively seek it. In the workplace, information is the key to the successes of organizations, and employees have to deal with overwhelming information from different sources as part of their daily jobs. Employees benefit from easier access to information; however, the speed of information generated is often much faster than individuals can process it (Edmunds

& Morris, 2000). Research has indicated that information overload can lead to stress, job dissatisfaction and health-related problems (Edmunds & Morris, 2000). Based on these three characteristics, it requires new procedures for individuals to interact in the workplace.

2.3 Technostress Creators

Technostress creators describe the factors that generate stress in the organizational environment associated with the use of ICTs (Tarafdar et al., 2010). ICTs can create stress in a number of ways. Several studies have focused on the measurement of technology characteristics for computer-related technostress (Ayyagari et al., 2011). They have identified some factors of technostress, which include information overload, complexity of technology, occupational crisis and personal life invasion (Wang, et al., 2008). Tarafdar et al. (2007) developed an open-ended questionnaire survey to validate the technostress measurement scale, based on 161firms in five U.S. metropolitan areas. Based on the survey results, authors defined five typical conditions where ICTs users can potentially suffer from technostress: techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty (Tarafdar, et al., 2010).

Techno-overload describes the situations where employees are forced to work longer and faster or change their working habits due to the advanced of ICTs (Tarafdar et al., 2007). "The technological development of the last 50 years have made more information more available to more people than at any other time in human history" (Feather, 1998, p. 11). Laptop, smart phone and other mobile communication tools have made employees simultaneously handle information from internal and external sources. Although individuals benefit from easier access to information, the information rate of growth is much faster than they can effectively handle and use (Edmunds & Morris, 2000). Employees are bombarded with information, even when they are not actively seeking it. Such a situation pushes employees to work faster and longer in order to cope with the increased processing requirement. This may lead employees to feel frustrated and reduce their productivity (Edmunds & Morris, 2000). These conditions are also known as "information fatigue" (Weil & Rosen, 1997) and "data smog" (Brillhart, 2004).

Techno-invasion creates a blurring of boundary between work-related and personal contexts, because employees feel they are always constantly "connected" (Tarafdaret al., 2007). By using modern email communication and wireless email devices, employees can be reached anywhere and anytime. It forces them to extend their regular work day and to work odd hours. They feel their personal lives have been invaded and they can never be free of those technologies. Therefore, they are likely to be dissatisfied with their work.

Techno-complexity means employees are unable to cope with the complexity of the new technology (Tarafdar, Tu, Ragu-Nathan, S., et al., 2007). Technologies are changing dramatically and are introduced frequently. Due to competitive pressure, many companies have to upgrade their systems frequently, which in turn necessiatates changes in work processes. At the same time, systems are becoming more and more complicated. And new systems could take months to learn and be implemented. This situation forces employees to constantly spend time and effort to learn ICT skills. Previous organizational behaviour literature indicated that ICT users may experience aversion, fear, anxiety or a sense of hassle (Yaverbaum, 1988), which makes them perceive technology as complicated. Studies have confirmed that users feel stress and job dissatisfaction when they find the system application and functionality difficult to understand (Weil & Rosen, 1997).

Technology-insecurity is associated with the situation in which employees fear being replaced by people who have better ICT skills. Or they may lose their jobs due to the automation resulting from new ICT systems. Because of the rapid change of ICT products and applications, it is difficult for ICT end users to develop a base of experience. They find their present and future job demands blurred (Sainfort, 1990). Studies have shown that ICT users may be passionate about learning new technology initially, but constant learning and updating can eventually cause frustration, stress and job dissatisfaction (Zorn, 2002).

Techno-uncertainty refers to the uncertainty about technology, due to constant changes in the ICT systems hardware and software. Organizations move from one cycle to another, with very little time between ICT system upgrades. This creates uncertainty for employees; that they have to keep learning new technology all the time. Furthermore, system upgrades require making decisions about systems configuration and customization, often a highly political and stressful process (Ragu-Nathan et al., 2008). Even after an upgrade has been made, ICT users are very likely to experience system crashes, data migration errors, poor documentation and inadequate technical resources and support. All of this may lead employees to feel frustration and job dissatisfaction.

2.4 Technostress Inhibitors

Adopting new ICTs in the workplace has become an unavoidable trend for most organizations. Technology advancement is not as simple as a solely technology change; it is also a change in social behaviour affecting individuals and groups in the organization (Nelson, 1990). In order to successfully introduce complex new ICT systems, organizations have to manage the changes from technical, social and structural aspects. Individuals experience stress due to stress-creating factors or conditions in the organization. Technostress inhibitors are described as the situational variables in the organizational environment, which can potentially reduce technostress among employees (Ragu-Nathan et al., 2008). They can also minimize stress-creating factors. Past research adopted the "transaction theory" to explain the situational factors that have moderating effects on the relationship between stressors and strain (Tarafdar, Qiang, Ragu-Nathan, & Ragu-Nathan, 2011).

Previous researchers categorized four types of technostress inhibitors: literacy facilitation, organization/technical support provision, involvement facilitation and innovation support (Tarafdar et al., 2011). “Literacy facilitation” refers to technical support in terms of related knowledge sharing through professional training or documentation (Tarafdar, et al., 2011). “Technical support” describes the assistance provided to professionals in the context of their ICT usage (Tarafdar et al., 2011). “Involvement facilitation” means keeping the end user involved from system initiation to development and implementation. “Innovation support” creates the climate to encourage the users to experiment and learn the system (Tarafdar, et al., 2011). This research focuses only on the involvement aspect of technostress inhibitors, because previous literature claimed that user involvements were critical to the quality of ICT systems and users’ satisfaction (Barki & Jon, 1994; Ives, Olson, & Baroudi, 1983).

2.5 User Involvement

Since the 1960s, researchers have considered the user involvement to be critical to the information system application development (Barki & Jon, 1994). User involvement appears to have a large influence on Information System quality and user satisfaction (Ives, et al., 1983). It also appears to improve end-user system utilization skills; develops end-user ability for decision making, and enhances their commitment to resultant application (Doll & Torkzadeh, 1989). In the ICT world, “user participation” and "user involvement" have been used interchangeably (Barki & Jon, 1994). However, previous research has claimed that "user participation" and "user involvement" are different; they should be defined separately (Barki & Jon, 1989).

User participation is defined as "a set of operations and activities performed by users" (Cavaye, 1995). It is considered the "observable behavior" among system users in the IS development process (Kappelman & Mclean, 1991). There are different types of participation: direct or indirect, formal or informal, performed alone or shared (Henri Barki & Jon, 1994). User involvement is described as "a need-based attitude or psychological state of users with regard to that process and to the resultant information system; and user engagement as the set of user behaviours and attitudes toward information systems and their developments" (Kappelman & Mclean, 1991, p. 342). Involvement refers to a particular attitude that users get when they believe a system to be both important and personally relevant (Barki & Jon, 1989). User participation can be viewed as one of the important antecedents of user involvement (Barki & Hartwick, 1991), because individuals seem more likely to view the system as important and personally relevant when they actively participate in system initiation, design and implementation (Barki & Hartwick, 1991). There are other antecedents; such as users' personal characteristics, user's previous experiences with the ICT system, the system's ease of use and the provision of system support (Barki & Hartwick, 1991). Due to the psychological state of involvement, previous literature has proved that it has a positive relationship with individual attitudes and behaviour

(Gardner, Mitchell, & Russo, 1985). To summarize, user participation, system and user characteristics, and user involvement can strongly affect individual usage of an ICT system.

The goal for implementing new ICT systems is to develop usable systems. Early and continual focus on the user becomes the key for developing usable systems (Karat, 1997). This is potentially achieved by involving potential users in the system design. Understanding user needs and user contexts is becoming increasingly crucial in ICT system development. Users can potentially be involved in different stages during the system development, and the level of involvement can vary from informative, through consultative to participative (Damodaran, 1996). This includes the initial planning, clarifying input–output information, approving system requirements, providing feedback from system design and implementation, the interface between system developers and other users, technical support and training for post-implementation (Tarafdar et al., 2010).

2.6 Job Satisfaction

Job satisfaction is defined as a "perceived relationship between what one wants from one's job and what one perceives it as offering" (Locke, 1969). It is an overall evaluation or emotional state of one's job experiences (Locke, 1976). Reflect back to Figure 1, the transaction-based stress model; there are two reasons to consider job satisfaction as a behaviour strain variable in this study. First; job satisfaction is a significant, organizational, valued outcome of work-related stress, which is relevant to the present study (Sullivan & Bhagat, 1992), because job satisfaction refers to employees' general attitudes toward their jobs (Choi Sang & Lee Yean, 2011). Alternatively, job satisfaction has been defined as one's positive attitude to his or her assigned tasks or jobs (Choi Sang & Lee Yean, 2011). It has a great impact on an employee's functioning, and could result in substantial loss to the organization (Ragu-Nathan et al., 2008). Second; job satisfaction among ICT users has played a central role in behavioural research in information systems (Melone, 1990). Measuring job satisfaction of ICT users has important outcomes in numerous work-related studies; such as evaluating system effectiveness and employee productivities (Melone, 1990).

As explained in the technostress creator section, different aspects of technostress creators could lead to dissatisfaction at work. Previous organizational behaviour literature has found a similar result. For example, Corbett, Martin, Wall and Clegg (1989) found job satisfaction decreased due to work changes in terms of computer-based technology change. As described in section 2.4, technostress inhibitors are defined as the situational variables in the organizational environment, which can potentially reduce technostress among employees (Ragu-Nathan et al., 2008). For example, user involvement makes employees better understand the system (Baroudi, Olson, & Ives, 1986). Therefore, they are more likely to accept the system and lead to increased job satisfaction (Ragu-Nathan et al., 2008).

2.6 Organizational Commitment

Organizational commitment can be defined in various diverse ways (Mowday, Steers, & Porter, 1979). Meyer and Allen (1991) summarized two approaches, which have been well established in the organizational commitment literature; "attitudinal commitment" and "behavioral commitment". Attitudinal commitment focuses on the identity of the person's link to the organization (Sheldon, 1971). In many ways, it represents the state that individuals consider to be the extent of their own values and goals as congruent with the particular organization and their wish to stay to facilitate these goals (March & Simon, 1958). Behavioural commitment represents the process of individuals who lock themselves into a particular organization and how they choose to deal with this problem (March & Simon, 1958).

There are three major components of organizational commitment: affective commitment, continuance commitment and normative commitment (Mowday et al., 1979). This research focuses on the affective commitment level only. It refers to the positive emotional attachment and identification of employees to the organization (O'Reilly & Chatman, 1986). Generally, organizational commitment is defined as loyalty to the organization, organization goals and values, willingness to make a personal effort on behalf of the organization and a strong desire to maintain membership of the organization (Mowday et al., 1979). The more common perspective views organizational commitment as a buffer in the stress–strain relationship (Donald & Siu, 2001). Beehr (1998) claimed that employees who suffer a high level of stress tend to have low organizational commitment. A number of other studies have also suggested correlations between job satisfaction and organizational commitment (Brooke, Russell, & Price, 1988; Rabinowitz & Hall, 1977).

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3 Research Hypotheses

3.1 Hypothesis 1

Studies have concluded that satisfaction from a given situation is related to the combination of one's feelings or attitudes associated with the variety of factors for that particular situation (Bailey & Pearson, 1983). With regard to ICT in the workplace, an individual's degree of job satisfaction derives from how he or she feels (both negatively and positively) about using ICT. Therefore, the individual's cognitions about computer usage play an important role in measuring the satisfaction of employees towards ICT-related jobs (Davis, Rivard, & Huff, 1988). Employees who exhibit positive cognition towards the technology tend to have a better satisfaction with ICT-related tasks (Tarafdar, et al., 2010). On the other hand, computer-anxious employees tend to show lower satisfaction about the system and applications they use; it leads them to dissatisfaction with their jobs and affects their ability to use ICTs (Harrison & Rainer Jr, 1996).

Technostress creators lead to lower employee job satisfaction through five factors, as mentioned in 2.3 technostress creators section; techno-overload, techno-invasion, techno-complexity, techno-uncertainty and techno-insecurity. ICT can generate stress, mainly because of the rapid development of technology, which means that systems change more frequently and are more complicated. This rapid technological development results in a steep learning curve, which requires employees to work longer and faster, and to find themselves continually dealing with technical problems and errors. Based on the above argument, it can be expected that technostress creators decrease employees' job satisfaction. This conclusion has theoretical support from organizational behaviour literature (Ragu-Nathan et al., 2008). Hence,

Hypothesis 1: Technostress creators negatively influence job satisfaction.

3.2 Hypothesis 2

In today's working environment, the rapid development of technology facilitates ICT applications and permeates deeply into everyday work. System software and hardware are being constantly upgraded, which may lead to a high level of stress. Previous studies indicated that situational variables considerably affect organizational outcomes, including organizational commitment (Colarelli, Dean, & Konstans, 1987). Organizational commitment has been considered a psychological outcome of organizational situations (Glazer & Kruse, 2008).

For example, techno-overload tends to force employees to multitask and process information from a variety of sources simultaneously. In order to fulfill tasks, employees have to work longer and faster. This leads to frustration and ineffective information processing (Fisher & Wesolkowski, 1999). Techno-invasion creates blurred boundaries between work and personal life, making employees feel that they are always "connected" (Tarafdar et al., 2007). Moreover, mobile computing devices and communication networks are everywhere; they can be reached from everywhere at any time. Employees perceive that their personal lives and spaces have been invaded (Weil & Rosen, 1997). Techno-complexity forces ICT users to frequently update their skills, and they have to spend time and effort to cope with the new skills. Previous organizational behaviour literature has found that ICT users may experience stress, aversion, fear and anxiety (Yaverbaum, 1988). Techno-uncertainty and techno-insecurity lead employees to be always working on new applications, under the continuous pressure of refreshing and updating their skills. Furthermore, ICT users fear losing their jobs (due to an inability to cope with new technology) or being replaced by advanced ICT systems. This gives them low self-confidence and feelings of anxiety (Heinssen et al., 1987).

Organizations normally cannot control the stressors inherent in the initial emotional reactions of employees to stressors; however, organizations can influence employees' emotional attachments to the organization (Glazer & Kruse, 2008). Glazer & Beehr (2005) indicate that the "individual's relationship with the organization is a direct result of stressors and it has no adaptive function". This means that highly committed employees are more likely to suffer stress, due to their high investment and strong identification with the organization (Mathieu & Zajac, 1990). The more common perspective views organizational commitment as a buffer in the stress–strain relationship (Donald & Siu, 2001). In this view, commitment behaves as a cognitive and behavioural barrier to moderate stressors (Glazer & Kruse, 2008). It is a psychological bond between employees and the organization (Meyer & Herscovitch, 2001). Such a bond provides individuals with a sense of stability, security and belonging; it enhances their ability to overcome organization stressors (Kobasa, 1982). Based on the above discussions, it can be hypothesized that there is an inverse relationship between technostress creators and organizational commitment. Hence,

Hypothesis 2: Technostress creators negatively influence organizational commitment.

3.3 Hypothesis 3

Job satisfaction refers to an individual response to one's job or aspect of one's job (Mowday et al., 1979). It is an individual's concerns about actual outcomes compared to what they expect from their jobs (Griffin, Hogan, Lambert, Tucker-Gail, & Baker, 2010). Job satisfaction focuses on the specific situation where employees perform their duties. Previous studies indicate that technostress is one of the determining factors of job satisfaction among ICT users in the organizational environment (Tarafdar et al., 2010). Organizational commitment refers to a mental state, that of the individual's identification, attachment and involvement in a particular organization (O'Reilly & Chatman, 1986). This study focuses on the affective dimension of organizational commitment, as this is most commonly related to work stressors (Yousef, 2002). Previous studies have found that job satisfaction is a less stable measurement than organizational commitment, as it reflects only the immediate or short-term reactions to certain aspects of the work environment (Porter, Steers, Mowday, & Boulian, 1974). Organizational commitment is defined as the general response to the whole organizational environment (Mowday et al., 1979). It more globally reflects the linkage between employees and the organization (Porter et al., 1974).

The relationship between job satisfaction and organizational commitment has been studied intensively. Several studies found positive relationships between job satisfaction and organizational commitment (Tett & Meyer, 1993). Some studies reported that job satisfaction is moderately correlated with organizational commitment (Hellman & McMillan, 1994; Jamal & Badawi, 1993). Dobreva-Martinova, Villeneuve, Strickland and Matheson (2002) suggested that “job satisfaction determines the level of commitment towards the organization, rather than vice versa”. Employees are willing to be involved in the organization if they are satisfied with that organization. Based on the above discussions, it can be hypothesized that there is a positive relationship between job satisfaction and organizational commitment. Hence:

Hypothesis 3: Employee job satisfaction positively influences the employee’s organizational commitment.

3.4 Hypothesis 4

User involvement can reduce technostress in several ways. First, it potentially provides more accurate and complete requirements from users. Users have opportunities to control and influence the whole process. They can express and clarify their needs during different stages of system development (Amoako-Gyampah & White, 1993). They can better predict the organization's strategies and operations. User involvement also helps to reduce system errors and unacceptable system features. In return, employees may spend less time going through these complex and unnecessary features. They feel that the system is easy and simple to use. Scholars have found that "perceived usefulness is the strongest motivator for system acceptance" (Mahmood, Burn, Gemoets, & Jacquez, 2000, p. 754). This means that users perceive the system can provide value and they are more likely to accept it. Consequently, users are less likely to feel frustrated about the system. Techno-complexity, techno-uncertainty and techno-insecurity thus can be reduced.

Second; user involvement improves user understanding of the system. Users are involved from system planning through to the implementation stage; they are more familiar with the system and feel less uncertain about its functionality and capability (Tarafdar et al., 2010). Users derive a positive attitude and behaviour from their involvement during the development of the targeted ICT. They are more willing to spend time and make an effort to upgrade their skills (Tarafdar et al., 2010). (This is more critical for large and complex system upgrades.) Users feel the delivered system can meet their needs and expectations, and so they are more able to manage their uncertainties and insecurities. Thus, techno-uncertainty, techno-complexity and techno-insecurity are reduced.

Third, user involvement leads to greater communication and better cooperation between users and system developers. Users and developers can present and exchange their views and constraints from different perspectives, which leads to better mutual understanding and conflict management during system design and implementation (Tarafdar et al., 2010), and thus enhances system acceptance and ownership (Tarafdar et al., 2010). Furthermore, both users and systems designers feel that the system design and implementation are less stressful, reducing the overall stress.

Based on the above discussion, it can be hypothesized that there is an inverse relationship between technostress creators and user involvement. Hence:

Hypothesis 4: User involvement negatively influences technostress creators.

3.5 Hypothesis 5

The purpose of user involvement is to encourage input from individuals into management decisions related to their daily work. Users who get involved from initial planning through to the implementation stage of a system can influence the system design according to their needs, to a certain degree (Robey & Farrow, 1982). They believe the system is important and consider themselves as having a high degree of relevance to it, which leads to a positive attitude toward to the system (Barki & Jon, 1989).

User involvement from the early stages of system development, make users better understand the system (Baroudi et al., 1986). They are more likely to accept the system and perceive it as useful. Previous studies have indicated that perceived usefulness and perceived ease of use are important predictors to measure end-user job satisfaction relating to ICT (Venkatesh, 1999). System acceptance is strongly affected by perceived usefulness (Mahmood et al., 2000). Users who perceive the system as providing value to their jobs are more likely to be satisfied with the system (Mahmood et al., 2000). A system is more likely to be accepted when users perceive it as easy to use (Davis, Bagozzi, & Warshaw, 1989). Users perceive it is easy to use and make less effort to use it. Then they are more likely to be satisfied with the system and therefore their jobs. It is all based on how well the user is involved in system design and support. Based on the above discussion, it can be hypothesized that there is a positive relationship between user involvement and job satisfaction. Hence:

Hypothesis 5: User involvement positively influences job satisfaction.

All of the above hypotheses are represented in the model illustrated in Figure 2 (section 1.4).

4 Research Method

4.1 Research Design Overview

The aim of the present study is to test a model to understand the relationship among technostress creators, technostress inhibitors, job satisfaction and organizational commitment. The aim of this chapter is to detail the methodology deployed. It includes participants' selection criteria, measurements for each variable and procedures utilized for this research. Most of the previous studies in this field have implemented a quantitative research method with a large sample size in order to generate statistical significance and generalization. Since the emphasis of this research is on explaining the variables and testing the relationships, the quantitative questionnaire is used, and statistical analysis was performed by using structural equation modeling (SEM). SEM consists of a set of linear equations, which can simultaneously test two or more relationships among observable and/or latent variables (Shook, Jr, Hult, & Kacmar, 2004).

4.2 Participants

For this research, the target participants were not limited to any particular occupation. Most of the previous research in this area has used samples from a particular occupation or a single organization (Ragu-Nathan et al., 2008; Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2007; Tarafdar et al., 2010). Employees from one organization share a single monopolistic “organizational culture” (McSweeney, 2002), while people from a particular occupation have the basis of similarity and share a common “occupational culture” (McSweeney, 2002) Therefore, the sample is narrow and pre-selected in the sense that organization and occupation were pre-selected. Nowadays, ICTs are becoming the most common systems in the organization (Brillhart, 2004). In order to fully understand the impact of ICTs in the general organizational environment, the sample frame would be better to consider a broad range of people. Everyone who works full-time or part-time and uses ICTs in their daily work can be included in this study, as they all have certain interactions with ICTs at their workplace.

Of the 356 people who accessed the Qualtrics questionnaire online, only 215 completed the survey, a 59% completion rate. This sample size was acceptable, as SEM requires a minimum of 200 samples (Kline, 2010). Participant demography showed a larger proportion of females (65%), compared to males (35%). The majority of participants (77%) were aged between 20 and 50 years old. Forty-six percent of participants had a post-graduate education level, and 40% had completed a bachelor’s degree. The computer confidence level was measured on a seven-point scale, from one (very bad) to seven (very good); the mean score was 5.73 with a standard deviation 0.9. This score of computer confidence is generally consistent with Ragu-Nathan (2008). Participants came from 22 different professions. The top three professional occupation sectors in this study were: management (24%); education training (14%), and community and social services (11%). Table 1 illustrates the participants' demographic information.

4.3 Materials

The purpose of this study is to understand the negative effects of technostress on organizational efficiency, and further to identify mechanisms to mitigate such negative effects. After reviewing the literature, technostress creators, technostress inhibitors, job satisfaction and organizational commitment were selected as the critical factors for the purpose of this study. A questionnaire comprising of four self-reported, previously validated scales was used to test the casual relationship between these factors. All the variables were measured on a five-point Likert scale anchored with “strongly disagree” to “strongly agree”. Demographic and background information was collected at the end of the survey, which included age group, gender, education, computer confidence and profession. Previous studies indicated more than five individual characteristics influence the perceived ease of use with respect to ICT (Ragu-Nathan et al., 2008). Appendix A shows the details about the questionnaire used for this research. The following paragraphs explain the procedures for measuring the four variables (technostress creators, technostress inhibitors, job satisfaction and organizational commitment) in this research.

4.3.1 Technostress Creators

The present study used 23-item, self-reported questions to measure five technostress creators—techno-overload, techno-invasion, techno-complexity, techno-uncertainty and techno-insecurity. The study used the content validation instrument provided by Ragu-Nathan et al., (2008). Content validation involved conducting interviews with participants to seek comments on the relevance and clarity of the questions in the context of their experience in technostress situations and associated organizational response (Ragu-Nathan et al., 2008). Based on the feedback, items were finalized for large-scale data collection (Ragu-Nathan et al., 2008). This instrument was also adopted by a number of other studies (Qiang et al., 2005; Wang, et al., 2008). The reliability analysis (coefficient alpha) of the technostress creator was measured as five individual creators. For the individual five technostress creators, the coefficient alpha values were measured as techno-overload (0.89), techno-invasion (0.81), techno-complexity (0.84), techno-insecurity (0.84) and techno-uncertainty (0.82). Appendix B lists all the characteristics of the participants.

4.3.2 Technostress Inhibitors

User involvement scale was measured by four self-evaluated items on a five-point Likert-type scale. Content validation was done by interviewing 10 information system users. They were asked to provide feedback on the relevance and clarity of these four questions, followed by large-scale data collection (Tarafdar et al., 2011). Four items were developed to examine user involvement; the coefficient alpha for this scale was measured at 0.87.

4.3.3 Job Satisfaction

Job satisfaction was measured by three items, using a five-point Likert scale based on Spector (1985). Because these studies extend previous studies, participants were asked to indicate in general how satisfied they were with their jobs, instead of job satisfaction towards ICT usage only. The coefficient alpha value was measured at 0.71 from an adopted scale (Spector, 1985), which scale has been used widely in the similar research (Ragu-Nathan et al., 2008).

4.3.4 Organizational Commitment

Organizational commitment factors were measured by adopting four self-rated items from the organizational commitment survey done by Meyer and Allen (1997), which has been widely adopted in the similar research (Ragu-Nathan et al., 2008). As discussed in the literature review section (2.8), this study only concentrated on the affective commitment level of organizational commitment. Therefore, four items were picked up from the original survey. The coefficient alpha of affective commitment scale was measured at 0.82.

4.4 Procedure

The survey was converted into an Internet survey. In order to satisfy the sample frame requirement, it showed clearly at the beginning of the survey that this survey was appropriate only for the full-time or part-time employees who used computer and mobile technology at their work on a daily basis. In this way it filtered out the population who were not working or were not business users of ICTs. The questionnaire included two parts: questions to measure variables of interest and demographic information. Email was selected as the major communication tool to recruit participants due to its low cost and efficient nature. A reminder email was sent to potential participants if they had not finished the survey within a certain period of time. The questionnaire was also posted on the Qualtrics website to invite voluntary participants from NZ only, or to forward the survey hyperlink to eligible participants. Due to the nature of the survey, which targeted mainly working professionals in New Zealand, survey links were posted on several New Zealand professional Linkedin groups, such as the New Zealand Business and Professional Network, New Zealand Business Analysts and the Information Security Interest Group of New Zealand, and university alumni groups, such as Massey University Alumni and Friends, Auckland University Alumni and Friends, University of Canterbury Alumni, Victoria University of Wellington Alumni, etc.

The advantage of collecting a survey online is that it reaches participants efficiently. Also, the data can be transferred to the SPSS system directly without any data entry errors. After collecting enough questionnaires, all the data was automatically transferred to the SPSS database. Error and missing data was excluded. Only the usable data was analyzed, using statistical analysis methods.

4.5 Ethics

According to the Massey University professional codes of conduct for human research, the rights and wellbeing of participants need to be considered. Therefore, informed consent is to be provided prior to the survey in this study. In addition, voluntary participation is stated at the beginning of the survey, and confidentiality and participant anonymity were assured to protect the privacy of the gathered information. It was clearly outlined on the questionnaire that participants could withdraw from the survey any time they preferred. As only minimal demographic data was collected, the confidentiality and anonymity of all participants were assured (no data regarding the individual identity of any participant was collected at any stage). The Massey University Human Ethics Committee has classified this research project "low risk", which means full ethics approval was not required.

5 Data Analysis

5.1 Data Analysis Overview

SPSS20 was used for quantitative analysis and Amos 20 was deployed for the structural equation model (SEM) and data analysis. All the results were collected from the online questionnaire from the Qualtrics website. Those results were then exported from Qualtrics to SPSS format data. Missing data and data errors were checked first, and then varieties of descriptive statistics analysis were conducted in SPSS20. Outliers were identified and removed to ensure the normality and linearity of the study. Several statistical analysis techniques have been applied to this study, which include data reliability and validity test, data transformation to assess the data distribution normality. A confirmatory factor analysis (CFA) was then conducted in Amos 20 to examine the psychometric properties of each scale. Common method bias was assessed to ensure the construct validity. Then a hypothesized model was drawn in Amos to analyze the directional relationships among technostress creators, user involvement, job satisfaction and organizational commitment. A variety of alternative goodness-of-fit indices were assessed to supplement the chi-square statistic. All of the above techniques attempt to adjust for the effect of sample size bias.

5.2 Data Entry

All the data were collected and exported from the database hosted by the Qualtrics website. A total of 361 participants filled in the online questionnaire, but only 215 questionnaires were fully completed with valid data, which was used in this research data analysis. The data was able to be uploaded into the data analysis programme directly without any manual entry errors.

5.3 Missing Data

The questionnaire was designed so respondents could choose from the options provided only. Further, they could select only one option per question and were not able to add their own comments. This minimized the chance of respondent error or invalidated values entered by participants. Missing data could occur for a variety of reasons: participants accidently missed out questions or exerted their right not to answer the questions (Field, 2009). Missing data could potentially generate statistical problems for data and SEM analysis (Field, 2009). In order to avoid issues from missing data, uncompleted questionnaires, or those missing data for measuring variables, were removed completely from the raw data.

5.4 Data Normality and Linearity

The theory behind inferential statistics is based on the assumption that sampling distribution is normally distributed (Field, 2009). According to the central limit theorem, if the sample data are approximately normal then the sampling distribution will be normal as well (Field, 2009). It is also important to assume that errors are normally distributed in the general linear model (Field, 2009). Therefore, the present study assessed all variables for normality and linearity.

The univariate normality test as the precondition of multivariate normality test and data analysis was explored to examine the distribution pattern and indicate problematic data (Johnson & Dean W, 1988). The first step was to assess the raw data to identify the outliers. Boxplots were conducted for the four variables to illustrate the outliers in each variable. Descriptive statistics, such as mean, standard deviation, skewness and kurtosis were applied to examine the normal distribution of all four variables. According to Balmer (1979), if the skewness is between -0.5 and +0.5, the distribution is approximately symmetric, and if the skewness is between -1 and -0.5 or between +0.5 and +1 the distribution is moderately skewed. Job satisfaction was found with -0.971 degree of skewness, which is in the range of -1 and -0.5. All other variables were within the range of -0.5 to +0.5. In terms of kurtosis, job satisfaction was found with 1.713 degree of kurtosis, which is much higher compared to the kurtosis of the other variables. The above results indicate that all three variables—user involvement, organizational commitment and technostress creators—are approximately normally distributed. And that job satisfaction was slightly non-normally distributed. This non-normal data may be due to the fact that more outliers occur in job satisfaction compared to the other variables.

The outlier score is very different from the rest of the data; such values can bias the models (Field, 2009). As outliers may bias the mean, standard deviation and correlation coefficient values, they must be dealt with carefully (Lomax & Schumacker, 2012). The options of dealing with outliers include removing the case, transforming the data and changing the score (Field, 2009). Data transformation by using the square root or log10 is recommended as the best way to correct the skewness (Lomax & Schumacker, 2012). However, after data transformation the degree of skewness and kurtosis is even worse than without data transformation. The z-score was formed to identify three outliers with score above +/-3.0. Mahalanobis' distance test was used to examine the multivariate normality (1936). This measures the influence of case by examining the distance of cases from the mean of the predictor variable (Field, 2009). Mahalanobis' distance test showed three cases with d-squared values which are significantly higher than the average value and with p1 values less than .05. This proved that the three cases are influential outliers; the correlation between the variables for these respondents are significantly different compared to the rest of the data set. Therefore, the three outliers with abnormal values were deleted from the data set. The descriptive statistics information is shown in Table 1 below.

Table 1: Descriptive Skewness and Kurtosis of the Technostress Construct

Descriptive Statistics

	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
User involvement	3.1566	.85935	-.434	.169	-.176	.337
Job satisfaction	4.0793	.69662	-.508	.169	.023	.337
Organizational commitment	3.4248	.75614	-.306	.169	-.044	.337
Technostress creator	2.8642	.64441	-.083	.169	.234	.337
Valid N (listwise)						

Based on the descriptive statistics data, the skewness and kurtosis problems have been solved. Kolmogorov-Smirnow and Shapiro-Wilk tests were conducted to see whether the distribution as a whole deviates from a comparable normal distribution (Field, 2009). The result indicated that the sample data normality was not satisfied, as the data normality was determined by both univariate and bivariate normality. A bivariate normality test was conducted to test all possible combinations of variables. The Q-Q plot identified three outliers for job satisfaction. This may be due to the fact that job satisfaction only has three measuring items in the questionnaire. Those three outliers were removed from the data set, thus eliminating the skewness and kurtosis issues. Multicollinearity and singularity tests were followed to examine the correlation and squared multiple correlations. Based on the low-reading result from these tests, those issues can be discounted. After the data cleaning process, the final sample size was reduced to 206.

6 Results

This chapter includes the construct reliability testing, confirmatory factor analysis (CFA), the common method bias test and model testing. The measurement procedure is conventionally evaluated in order to produce reliable and valid data (Spicer, 2005). To evaluate the construct reliability of variables, reliability analysis can be used to measure the internal consistency (Spicer, 2005). Cronbach's alpha is the most commonly used test to measure the scales of each variable from multiple Likert questionnaires (Field, 2009). Spicer (2005) suggested that an alpha value of 0.7 provides the minimal reassurance of internal consistency. Although a higher value is desirable, values around 0.8 indicate good reliability (Field, 2009; Spicer, 2005). Cronbach's alpha coefficient of the overall scale in the technostress construct ranged from 0.872 to 0.883, which indicated the reliability of the current technostress construct. CFA, as the preliminary step of structural equation modeling (SEM), tests for possible error correlations among items (Byrne, 2010). Therefore, CFA, to a degree, suggests a measure of convergent and discriminate validity of constructs, then yields a good fit model with fewer items. Table 2 illustrates the mean, standard deviation and Cronbach's alpha value of each item in the current technostress construct, which provides the reliability of this construct.

Table 2: Construct Items, Reliability, Mean and Standard Deviation

Items	**Description**	**Mean**	**Standard Deviation**	**Cronbach's Alpha**
Technostress Creator Techo-overload (TOV)				
TOV1:	I am forced by technology to work much faster	3.17	1.019	0.875
TOV2:	I am forced by technology to do more work than I can handle	2.94	1.022	0.874
TOV3:	I am forced by technology to work with very tight time schedule	3.02	1.031	0.874
TOV4:	I am forced to change my work habits to adapt to new technologies	3.61	1.020	0.875
TOV5:	I have to spent a lot of time every day reading an overwhelming amount of e-mail messages	3.59	1.130	0.875
Techno-invasion (TIN)				
TIN1	I spend less time with my family due to technology advancement	3.04	1.108	0.877
TIN2	I have to be in touch with my work even during my vacation due to technology	3.00	1.158	0.874

	advancement			
TIN3	I have to sacrifice my vacation and weekend time to keep current on new technologies	2.63	1.069	0.872
TIN4	I feel my personal life is being invaded by technology advancement	3.10	1.119	0.876
Techno-complexity (TCO)				
TCO1	I do not know enough about ICTs to handle my job satisfactorily	2.63	1.064	0.874
TCO2	I need a long time to understand and use new technologies	2.64	1.086	0.875
TCO3	I do not find enough time to study and upgrade my technology skills	3.21	1.088	0.876
TCO4	I find new recruits to this organization know more about computer technology than I do	3.04	1.104	0.875
TCO5	I often find it too complex for me to understand and use new technologies	2.66	1.101	0.876
Techno-insecurity (TIS)				
TIS1	I feel constant threat to my job security due to new technologies	3.67	0.883	0.875
TIS2	I have to constantly update my skills to avoid being replaced	3.24	1.094	0.873
TIS3	I am threatened by co-workers with newer technology skills	2.80	1.061	0.872
TIS4	I do not share my knowledge with my co-workers for fear of being replaced	3.17	1.092	0.875
TIS5	I feel there is less sharing of knowledge among co-workers for fear of being replaced	2.28	1.048	0.873
Techno-uncertainity (TUN)				
TUN1	There are always new developments in the technologies we use in our organization	2.66	1.177	0.872

TUN2	There are constant changes in computer software in our organization	2.35	1.062	0.873
TUN3	There are constant changes in computer hardware in our organization	1.86	0.829	0.876
TUN4	There are frequent upgrades in computer networks in our organization	2.13	1.023	0.875
Technostress Inhibitor User Involvement (UI)				
UI1	We are encouraged to try out new technologies in our organization	3.50	0.946	0.877
UI2	We are rewarded for using new technologies in our organization	2.94	1.058	0.877
UI3	We are consulted before introduction of new technology in our organization	3.06	1.107	0.878
UI4	We are involved in technology change and/or implementation in our organization	3.12	1.126	0.879
Job Satisfaction (JS)				
JS1	I like doing the things I do at work	4.10	0.694	0.883
JS2	I feel a sense of pride in doing my job	4.13	0.774	0.882
JS3	My job is enjoyable	4.01	0.796	0.883
Organizational Commitment (OC)				
OC1	I would be happy to spend the rest of my career in this organization	3.34	1.055	0.879
OC2	I enjoy discussing my organization with people outside it	3.75	0.895	0.879
OC3	I really feel as if this organization's problems are my own	3.08	1.006	0.876
OC4	This organization has great deal of personal meaning for me	3.52	1.006	0.879

6.1 Confirmatory Factory Analysis

CFA was conducted with AMOS version 20 for each scale. Apart from technostress, which is a multidimensional scale, the other three factors are all single dimensional variables. First; all the 34 first-order items were loaded into AMOS to examine the correlations among their error terms. Based on Hair et al. (2010), the acceptable factor loading should be above 0.50. One item under organizational commitment was below the .50 threshold. In order to reduce the items and improve the confirmatory factor model fit, 33 items were identified with acceptable regression weight, and one item was deleted. Table 3 shows the overall construct reliability once the other one item was removed

Table 3: Reliability Test of Technostress Stress Construct

		Construct	Standardized	Unstandardized	S.E.	C.R.	P
UI4	<---	User involvement	0.859	1			
UI3	<---		0.853	0.976	0.08	12.217	***
UI2	<---		0.651	0.712	0.074	9.581	***
UI1	<---		0.527	0.516	0.069	7.505	***
JS1	<---	Job satisfaction	0.871	1			
JS2	<---		0.880	1.126	0.068	16.574	***
JS3	<---		0.891	1.173	0.07	16.877	***
OC1	<---	Organizational commitment	0.683	1			
OC2	<---		0.796	0.988	0.111	8.883	***
OC4	<---		0.714	0.996	0.119	8.383	***

	-						
TUN4	<---	Techno-uncertainty	0.635	1			
TUN3	<---		0.581	0.742	0.1	7.425	***
TUN2	<---		0.747	1.22	0.134	9.115	***
TUN1	<---		0.717	1.299	0.147	8.825	***
TIS5	<---	Techno-insecurity	0.797	1.285	0.134	9.579	***
TIS4	<---		0.522	0.898	0.132	6.754	***
TIS3	<---		0.609	0.994	0.129	7.719	***
TIS2	<---		0.542	0.912	0.131	6.985	***
TIS1	<---		0.515	0.81	0.128	6.864	***
TCO5	<---	Techno-complexity	0.566	0.958	0.132	7.251	***
TCO4	<---		0.560	0.951	0.132	7.191	***
TCO3	<---		0.535	0.896	0.13	6.91	***
TCO2	<---		0.551	0.92	0.13	7.085	***
TCO1	<---		0.664	1.087	0.131	8.297	***
TIN4	<---	Techno-invasion	0.521	0.898	0.133	6.756	***
TIN3	<---		0.701	1.152	0.133	8.667	***
TIN2	<---		0.530	0.944	0.138	6.849	***
TIN1	<---		0.574	0.963	0.141	7.321	***
TOV5	<---	Techno-overload	0.505	0.89	0.139	6.452	***
TOV4	<---		0.527	0.716	0.141	7.305	***
TOV3	<---		0.597	0.946	0.125	7.59	***
TOV2	<--		0.582	0.915	0.123	7.429	***

TOV1	<---		0.513	0.805	0.121	6.664	***

Notes: *** p < .000

The second step was to verify the existence of second-order constructs for technostress creators. According to Bryne (2010), the minimum number of four sub-constructs for variables are derived from the mathematically valid model in CFA. Technostress creators have five factors which meet the requirement. The first-order, correlated measurement model for technostress creators ran first, and then the second-order measurement model for technostress. After these, the target coefficient was calculated, which is the ratio of chi-square of the first-order to the chi-square of the second-order model (Doll, Xia, & Torkzadeh, 1994). This value can be interpreted as the percentage of variation indicated by the second-order model compared to the first-order correlated model (Marsh & Hocevar, 1985). In this case the target coefficient was found to be 0.98, which was higher than the recommend value of 0.8 (Marsh & Hocevar, 1985). The model comparison result is shown in Table 4. Following the second-order CFA test, technostress creators was conceptualized as second-order constructs, which included five first-order sub-constructs: techno-overload (TOV), techno-invasion (TINV), techno-complexity (TCOM), techno-insecurity (TIS) and techno-uncertainty (TUN).

Table 4: AMOS Output for Confirmatory Factor Analysis

Model	χ^2	DF	P	CMIN/DF	IFI	TLI	CFI	RMSEA	PCLOSE
First-order technostress model	693.006	220	0.000	3.15	0.83	0.782	0.826	0.102	0.000
Second-order technostress model	704.518	225	0.000	3.13	0.827	0.803	0.825	0.102	0.000

6.2 Common Method Bias Analysis

Due to the cross-sectional nature of the research design, and the use of self-report questionnaires, this study may produce biased data, possibly socially desirable answers or systematic measurement errors (Lindell & Whitney, 2001; Siemsen, Roth, & Oliveira, 2010). Common method bias is one of the main sources of measurement error, which would violate the validity of the conclusions about the measurement and yield misleading conclusions (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Cote and Buckley (1987) claim that approximately 26.3% of the variance of research is due to common method bias. Although a certain level of bias does not necessarily invalid the research result (Doty & Glick, 1998), this bias could potentially inflate or deflate the observed relationships between the constructs, thus leading to Type I or Type II errors (Podsakoff et al., 2003). According to Podsakoff et al. (2003), common method bias could be minimized during the research design phase, such as during questionnaire design, and guarantee the anonymity of participants.

The present study utilized the commonly used Harmon's single factor test and CFA to test the presence of common method bias effect. First; Harmon's single factor test was conducted in SPSS using exploratory factor analysis, with all 33 items used in the final model loaded into a single factor. After the un-rotated factor analysis, one factor emerged from measurement, which accounted for 24.87% of the total variance only. Podsakoff et al. (2003) indicated that Harmon's single factor test is insensitive and not sufficient to prove that common method bias is not present. The next CFA model was used as a common latent factor test to estimate variance in AMOS. Furthermore, the marker variable method was conducted to estimate the common method bias, which is probably a more accurate test compared to the common latent factor method (Lindell & Whitney, 2001). This was done by adding another latent variable, which was theoretically uncorrelated with the other latent variables in the model (Lindell & Whitney, 2001). All of the above tests provided evidence that the present model satisfied discriminant validity.

6.3 Model Testing

The present study used AMOS 20 to conduct SEM to test the proposed hypotheses. SEM has the power to combine factor analysis and multiple regressions to test the underlying factors and determine the variables that load onto each factor, and also to identify the set of independent variables explained by the portion of variance of those particular dependent variables (Tabachnick, Fidell, & Osterlind, 2001). Second; SEM can test several multiple regression equations simultaneously, combined with the use of moderators and mediators when necessary (Byrne, 2010). Third; SEM provides explicit estimates of both observed and unobserved variables, while the former analysis method can only handle observed measurements (Byrne, 2010). The current study adopted theoretically driven, alternative modeling to test, and modified the hypothesis model so it made theoretical sense, and with a good fit of data.

Then the goodness-of-fit statistics of the second-order technostress creator construct was reviewed. The second order CFA construct didn’t yield an acceptable fit CFI=0.825, IFI=0.827, RMSEA=0.102. Even when all the items were loaded significantly onto their designated factor, the factor loading values were all above 0.50. Then the modification indices (MIs) related to the covariance, and the standardized residual covariance were examined to identify any misfit items in the construct. There were seven MI values that were substantially larger than the rest of the estimates; this related to covariation between the error terms associated with each item. A high MI value represents the presence of factor cross-loadings and error covariance respectively (Byrne, 2010). According to the result, and in order to achieve goodness-of-fit, the following items were removed from the construct: TOV2, TOV4, TCO1, TCO5, TIS1, TIN4 and TUN3. Therefore, three items were left for each of the first-order sub-constructs. The following result (shown in Table 5) was achieved for the technostress creator second-order model.

Table 5: AMOS Output for Second-Order Technostress Construct

Model	χ^2	DF	P	CMIN/DF	IFI	TLI	CFI	RMSEA	PCLOSE
Trimmed second-order technostress model	154.574	85	0.000	1.82	0.952	0.940	0.951	0.063	0.086

The path model was then run in AMOs with measurement models: the technostress creators construct was modeled as a second-order construct, while the other three variables (job satisfaction, organizational commitment and user involvement) were modeled as first-order constructs. The overall model yielded an acceptable level, χ^2 = 422.45, df= 242, χ^2/df = 1.7; a normal chi-squared test result of three or less is not significant, and indicates that the model fits the data adequately (Kline, 2010). The sensitivity of the chi-square goodness-of-fit test is largely influenced by the sample size, which is ideally between 100 and 200 (Tabachnick et al., 2001). Therefore, it is more reasonable and appropriate to assess a range of other indices of fit. In reviewing other fit indices, the hypothesized model had a relatively acceptable fitting, as indicated by CFI=0.925, IFI=0.926. In addition, RMSEA=0.060, which is within the recommended range of acceptability between 0.05 and 0.08 (Byrne, 2010). However, PCLOSE=0.04 is less than satisfactory, lower than the minimum 0.05 threshold value (Byrne, 2010). A summary of the initial model is shown in Table 6 and Table 7 below.

Table 6: AMOS Output of Initial Model: Summary Notes

Notes for Model	
Computation of degrees of freedom	
Number of distinct sample moments:	324
Number of distinct parameters to be estimated:	82
Degrees of freedom (324 - 82):	242

Result	
Minimum was achieved	
Chi-square	422.45
Degrees of freedom	242
Probability level	0

Table 7: AMOS Output of Initial Model: Goodness of Fit Statistics

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	82	422.45	242	0	1.746
Saturated model	324	0	0		
Independence model	48	2670.517	276	0	9.676

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0.842	0.82	0.926	0.914	0.925
Saturated model	1		1		1
Independence model	0	0	0	0	0

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	0.877	0.738	0.811
Saturated model	0	0	0
Independence model	1	0	0

NCP

Model	NCP	LO 90	HI 90
Default model	180.45	127.226	241.535
Saturated model	0	0	0
Independence model	2394.517	2232.6	2563.82

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.061	0.88	0.621	1.178
Saturated model	0	0	0	0
Independence model	13.027	11.681	10.891	12.506

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.06	0.051	0.07	0.04
Independence model	0.206	0.199	0.213	0

AIC

Model	AIC	BCC	BIC	CAIC
Default model	586.45	609.228		
Saturated model	648	738		
Independence model	2766.517	2779.85		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.861	2.601	3.159	2.972
Saturated model	3.161	3.161	3.161	3.6
Independence model	13.495	12.705	14.321	13.56

HOELTER

Model	HOELTER 0.05	HOELTER 0.01
Default model	136	144
Independence model	25	26

A model with an acceptable statistical value but with a poor fit in other areas is by no means usual, so it is essential to assess model relationship to see if the model needs to be fine-tuned. This can be achieved by trimming the model or by building it by removing or adding direct effects. It is also important to ensure, all the relationships are in the expected direction (Bollen & Long, 1993; Kline, 2010). The modification index (MI) can help to determine which direct effect should be included in the model, which is more likely to contribute to the explanation of the data (Abramson, Rahman, & Buckley, 2005). The larger the MI value, the greater model improvement can be achieved by that direct effect (Arbuckle, 2005).

The MI value 18.399 is associated with the regression path flowing from user involvement to organizational commitment and needs to be freely estimated in a subsequent model to achieve a significant parameter change at 0.324. This direct link was not expected from the initial hypothesis model. However, it seems reasonable that the more involvement employees have in organizational tasks or work, the more commitments they will have to the organization. Therefore, the initial model was modified to allow the path flow from user involvement to organizational commitment to be freely estimated. As a consequence, the significant chi-square difference between the initial and revised model was $\chi^2 = 24.401$. By adding this direct link, the model fit index achieved CFI= 0.934, IFI= 0.935, RMSEA= 0.056, which was slightly improved compared to the previous model. The revised model was PCLOSE= 0.142, which was a significant improvement compared to the initial model PCLOSE value 0.04. The MI index value is shown in Table 8

Table 8: AMOS Output of Regression Weights (Initial Model)

			M.I.	Par Change
Organizational commitment	<---	user involvement	18.399	0.324
Uncertainty	<---	Job satisfaction	5.979	-0.168
Insecurity	<---	user involvement	4.500	0.189
Complexity	<---	user involvement	11.690	-0.358
OC2	<---	user involvement	5.796	0.174
OC1	<---	Complexity	5.305	0.157

			M.I.	Par Change
UI2	<---	Job satisfaction	5.263	-0.207
UI3	<---	Job satisfaction	5.591	0.269
UI3	<---	Organizational commitment	20.736	0.460
TUN1	<---	User involvement	4.475	0.170
TUN2	<---	Complexity	8.354	0.158
TUN4	<---	Organizational commitment	6.006	-0.204
TIN1	<---	Overload	4.517	0.245
TIS3	<---	User involvement	4.646	0.161
TIS4	<---	Invasion	4.739	-0.227
TCO3	<---	Organizational commitment	4.128	-0.171
TOV5	<---	Organizational commitment	4.016	0.207
TOV5	<---	Complexity	12.806	0.282

Reviewing the regression weights of the initial model indicated that the path from user involvement to job satisfaction was not significant (γ = 0.064, ρ = 0.386, C.R. = 0.866; β = 0.071). As a result, hypothesis 5, which states user involvement positively influences job satisfaction, was rejected. The above regression weights results are shown in the following Table 9 and Table 10

Table 9: AMOS Output of Regression Weights (Modified Model)

			Estimate	S.E.	C.R.	P	Label
Technostress	<---	User involvement	0.212	0.063	3.382	***	par_24
Job satisfaction	<---	Technostress	-0.518	0.142	-3.655	***	par_17
Job satisfaction	<---	User involvement	0.064	0.074	0.866	0.386	par_20
Overload	<---	Technostress	1.000				

			Estimate	S.E.	C.R.	P	Label
Complexity	<---	Technostress	1.011	0.228	4.445	***	par_11
Insecurity	<---	Technostress	1.336	0.254	5.255	***	par_12
Invasion	<---	Technostress	1.161	0.241	4.821	***	par_13
Uncertainty	<---	Technostress	1.335	0.245	5.454	***	par_14
Organizational commitment	<---	Job satisfaction	0.840	0.117	7.207	***	par_23
Organizational commitment	<---	Technostress	0.414	0.148	2.792	0.005	par_25

Table 10: AMOS Output of Standardized Regression Weights (Modified Model)

			Estimate
Technostress	<---	User involvement	0.328
Job satisfaction	<---	Technostress	-0.368
Job satisfaction	<---	User involvement	0.071
Overload	<---	Technostress	0.676
Complexity	<---	Technostress	0.469
Insecurity	<---	Technostress	0.656
Invasion	<---	Technostress	0.856
Uncertainty	<---	Technostress	0.806
Organizational commitment	<---	Job satisfaction	0.706
Organizational commitment	<---	Technostress	0.248

In order to test the relationship among technostress creators, job satisfaction and organizational commitment, the present study proposed that technostress creators have negative impacts on job satisfaction and organizational commitment. A review of the result from the direct effects model (Figure 3), of technostress creators on job satisfaction and organizational commitment confirmed hypothesis 1, that technostress creators negatively influence job satisfaction (γ = -.494, ρ = .000, and β = -.356). It also confirmed hypothesis 2, that technostress creators negatively influence organizational commitment (γ = -.325, ρ = .037, and β = -.196). All the above results are shown in

Table 11 and Table 12. However, after adding the path between job satisfaction and organizational commitment, the relationship between technostress creators and organizational commitment became non significant A mediating effect is created when a third variable intervenes between two other related variables (Hair et al., 2010). The mediating effect can establish direct and indirect effects (Hair et al., 2010).

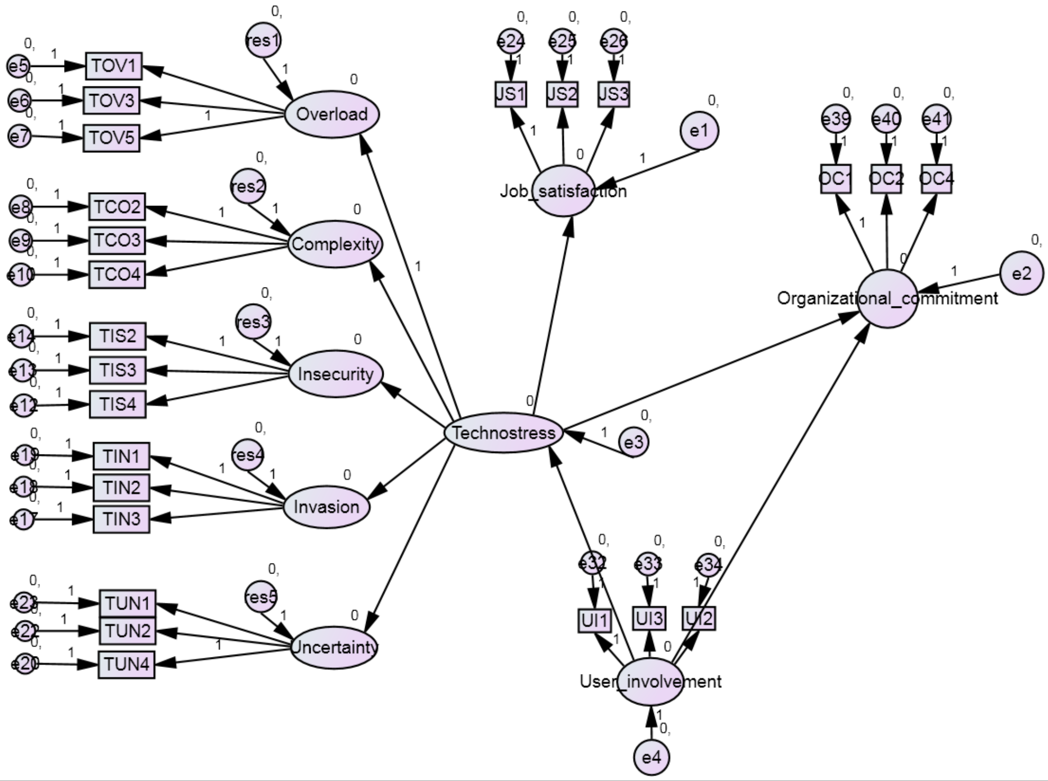

Figure 3: Technostress Direct Effect Model

Table 11: Technostress Direct Effect Model Regression Weights

			Estimate	S.E.	C.R.	P	Label
Job satisfaction	<---	Technostress	-0.494	0.130	-3.790	***	par_17
Organizational commitment	<	Technostress	-0.325	0.156	-2.082	0.037	par_24

	Estimat e	S.E .	C.R .	P	Label

Table 12: Technostress Direct Effect Model Standardized Regression Weights

			Estimate
Job satisfaction	<---	Technostress	-0.356
Organizational commitment	<---	Technostress	-0.196

The relationship between technostress creators and organizational commitment becomes non-significant when job satisfaction is included as a mediating construct. Tables 13 and 14 demonstrate the result from the partial mediation model (Figure 4). This evidence has found that job satisfaction fully mediates the effect of technostress creators on organizational commitment.

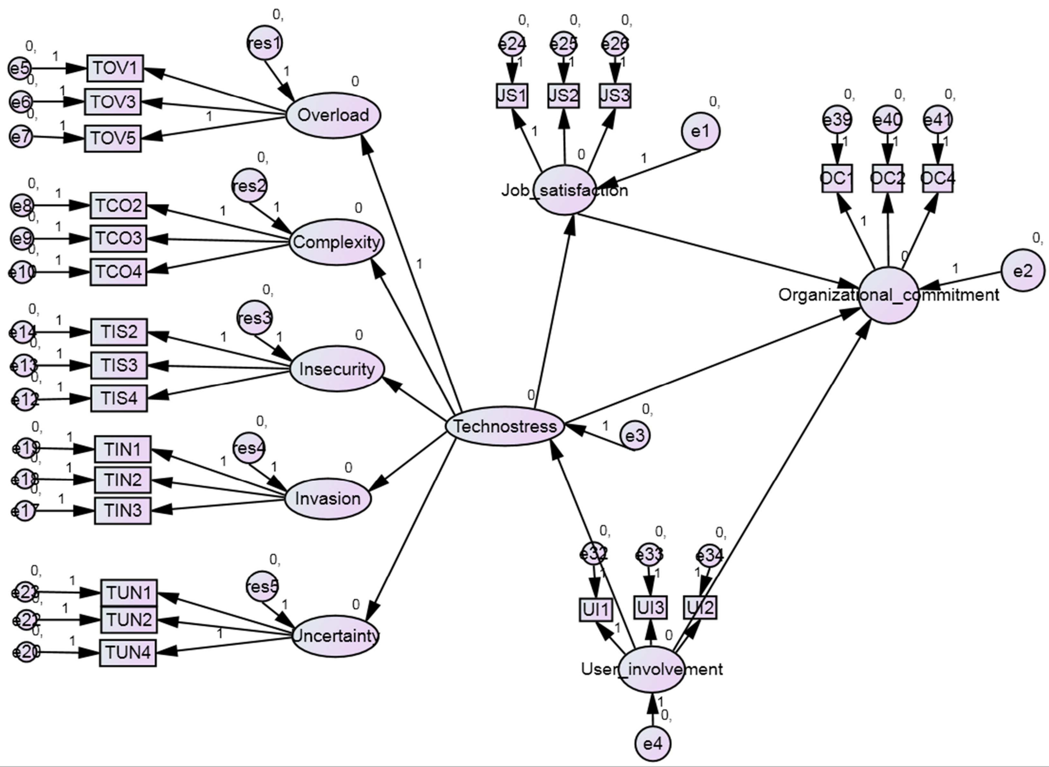

Figure 4: Technostress Partial Mediation Model

Table 13: Technostress Partial Mediation Model Regression Weights

			Estimate	S.E.	C.R.	P	Label
Job satisfaction	<---	Technostress	-0.464	0.128	-3.632	***	par_17
Organizational commitment	<---	Technostress	0.152	0.129	1.176	0.239	par_24
Organizational commitment	<---	Job satisfaction	0.794	0.109	7.307	***	par_25

Table 14: Technostress Partial Mediation Model Standardized Regression Weights

			Estimate
Job satisfaction	<---	Technostress	-0.336
Organizational commitment	<---	Technostress	0.094

			Estimate
Organizational commitment	<---	Job satisfaction	0.680

Table 15: Model Comparisons for Structural Models

	Model Fit Indices					Model Differences			
Model	**χ^2**	**df**	**CFI**	**RMSEA**	**SRMR**	**χ^2**	**Δdf**	**p**	**Details**
1. Direct Effects Model	476.568	243	0.902	0.068	0.098				
2. Partial Mediation Model	398.435	242	0.935	0.056	0.072	78.133	1	0.000	Model 1 to 2
3. Full Mediation Model	399.824	243	0.935	0.056	0.073	76.744	0	0.000	Model 3 to 1
						1.389	1	0.000	Model 3 to 2

However, in order to achieve a more robust result, the initial path from technostress creators to organizational commitment was rejected (γ = .152, ρ = .239, and β = -.094), then resulted the full mediation model. The above Table 15 compared the model fit of three proposed models (direct effects model, partial mediation model and full mediation model). Using Hair et al.'s (2010) analyses regarding testing comparison models, it was found that if the addition of a path from technostress to organizational commitment improves the fit significantly, as indicated by the $\Delta\chi^2$" then mediation is not supported. In this case, the full mediation and the partial mediation models produce similar fits, and so mediation is supported (Hair et al., 2010). The final model (Figure 5), and a summary of the AMOS output statistics, is presented below in Table 16 and Table 17.

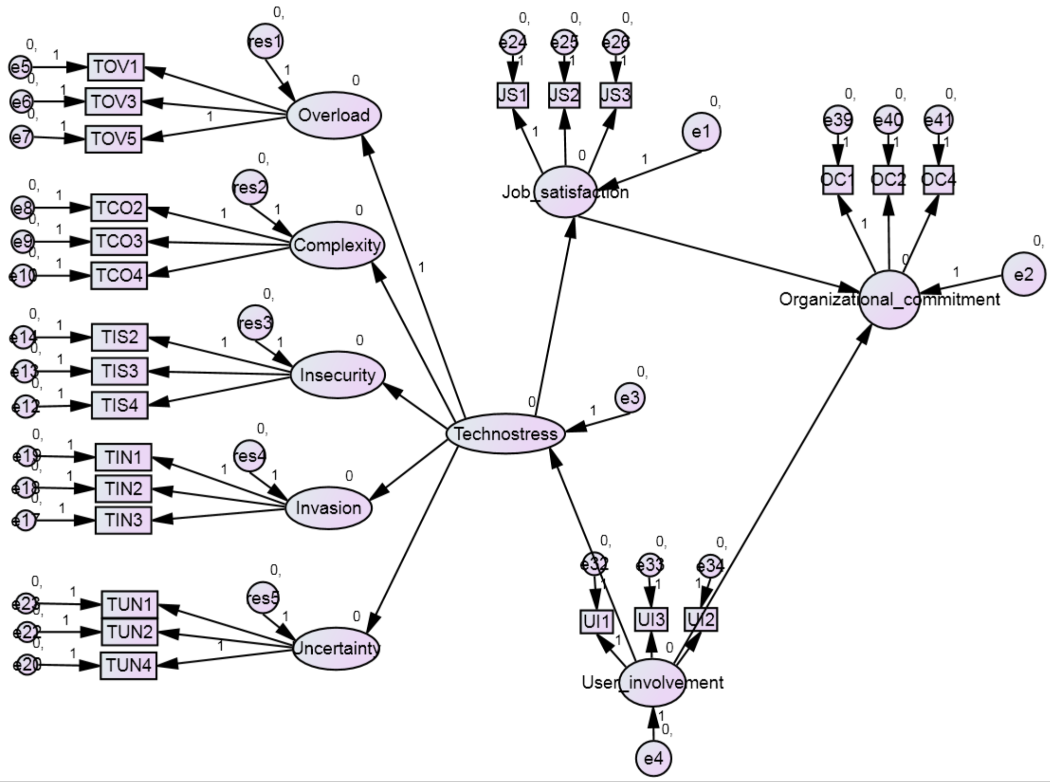

Figure 5: Final Model

Table 16: AMOS Output (Final Model): Notes for Model

Computation of degrees of freedom	
Number of distinct sample moments:	324
Number of distinct parameters to be estimated:	81
Degrees of freedom (324 - 81):	243
Result	
Minimum was achieved	
Chi-square	399.824
Degrees of freedom	243
Probability level	0

Table 17: AMOS Output of Final Model: Goodness of Fit Statistics

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	81	399.824	243	0	1.645
Saturated model	324	0	0		
Independence model	48	2670.517	276	0	9.676

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0.85	0.83	0.935	0.926	0.935
Saturated model	1		1		1
Independence model	0	0	0	0	0

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	0.88	0.749	0.823
Saturated model	0	0	0
Independence model	1	0	0

NCP

Model	NCP	LO 90	HI 90
Default model	156.824	105.854	215.695
Saturated model	0	0	0
Independence model	2394.517	2232.6	2563.815

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.95	0.765	0.516	1.052
Saturated model	0	0	0	0
Independence model	13.027	11.681	10.891	12.506

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.056	0.046	0.066	0.152
Independence model	0.206	0.199	0.213	0

AIC

Model	AIC	BCC	BIC	CAIC
Default model	561.824	584.324		
Saturated model	648	738		
Independence model	2766.517	2779.85		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.741	2.492	3.028	2.85
Saturated model	3.161	3.161	3.161	3.6
Independence model	13.495	12.705	14.321	13.56

HOELTER

Model	HOELTER 0.05	HOELTER 0.01
Default model	144	153
Independence model	25	26

The estimation of the revised model yielded an overall χ^2 =399.824, df= 243, χ^2/df = 1.65, which indicates good model fit. In addition, the goodness-of-fit indices suggested a good fit of model with CFI=0.935, IFI=0.935, RMSEA= 0.056, PCLOSE= 0.142. After removing the path between technostress creators and organizational commitment, all parameters and path estimates in the final model are statistically significant and meaningful. The structural path regression weights associated with the final model are presented in Table 18 and Table 19.

Table 18: AMOS Output of Regression Weights (Final Model)

			Estimate	S.E.	C.R.	P	Label
Technostress	<---	User involvement	0.198	0.062	3.202	0.001	par_23
Job satisfaction	<---	Technostress	-0.454	0.127	-3.578	***	par_17

			Estimate	S.E.	C.R.	P	Label
Overload	<---	Technostress	1.000				
Complexity	<---	Technostress	0.992	0.222	4.473	***	par_11
Insecurity	<---	Technostress	1.314	0.248	5.302	***	par_12
Invasion	<---	Technostress	1.169	0.239	4.888	***	par_13
Uncertainty	<---	Technostress	1.289	0.235	5.477	***	par_14
Organizational commitment	<---	User involvement	0.428	0.085	5.031	***	par_22
Organizational commitment	<---	Job satisfaction	0.755	0.102	7.374	***	par_24
TOV5	<---	Overload	1.000				
TOV3	<---	Overload	1.427	0.185	7.732	***	par_1
TOV1	<---	Overload	1.207	0.160	7.543	***	par_2
TCO4	<---	Complexity	0.946	0.083	11.421	***	par_3
TCO3	<---	Complexity	0.895	0.081	11.061	***	par_4
TCO2	<---	Complexity	1.000				
TIS4	<---	Insecurity	0.910	0.084	10.783	***	par_5
TIS3	<---	Insecurity	1.079	0.086	12.564	***	par_6
TIS2	<---	Insecurity	1.000				
TIN3	<---	Invasion	1.600	0.219	7.302	***	par_7
TIN2	<---	Invasion	1.310	0.197	6.656	***	par_8
TIN1	<---	Invasion	1.000				
TUN4	<---	Uncertainty	1.000				
TUN2	<---	Uncertainty	1.259	0.117	10.756	***	par_9
TUN1	<---	Uncertainty	1.455	0.132	10.989	***	par_10
JS1	<---	Job satisfaction	1.000				
JS2	<---	Job satisfaction	1.124	0.067	16.664	***	par_15
JS3	<---	Job satisfaction	1.174	0.069	17.021	***	par_16
UI1	<---	User involvement	1.000				
UI3	<---	User involvement	0.980	0.128	7.659	***	par_18
UI2	<---	User involvement	1.326	0.151	8.792	***	par_19
OC1	<---	Organizational commitment	1.000				
OC2	<---	Organizational commitment	1.074	0.119	9.040	***	par_20

			Estimate	S.E.	C.R.	P	Label
OC4	<---	Organizational commitment	0.917	0.117	7.803	***	par_21

Table 19: AMOS Output of Standardized Regression Weights (Final Model)

			Estimate
Technostress	<---	User involvement	0.309
Job satisfaction	<---	Technostress	-0.328
Overload	<---	Technostress	0.689
Complexity	<---	Technostress	0.470
Insecurity	<---	Technostress	0.657
Invasion	<---	Technostress	0.872
Uncertainty	<---	Technostress	0.792
Organizational commitment	<---	User involvement	0.415
Organizational commitment	<---	Job satisfaction	0.648
TOV5	<---	Overload	0.563
TOV3	<---	Overload	0.880
TOV1	<---	Overload	0.753
TCO4	<---	Complexity	0.793
TCO3	<---	Complexity	0.761
TCO2	<---	Complexity	0.852
TIS4	<---	Insecurity	0.730
TIS3	<---	Insecurity	0.891
TIS2	<---	Insecurity	0.801
TIN3	<---	Invasion	0.879
TIN2	<---	Invasion	0.664
TIN1	<---	Invasion	0.530
TUN4	<---	Uncertainty	0.697
TUN2	<---	Uncertainty	0.845
TUN1	<---	Uncertainty	0.881
JS1	<---	Job satisfaction	0.872
JS2	<---	Job satisfaction	0.880
JS3	<---	Job satisfaction	0.893
UI1	<---	User involvement	0.722
UI3	<---	User involvement	0.605
UI2	<---	User involvement	0.857
OC1	<---	Organizational commitment	0.671
OC2	<---	Organizational commitment	0.851
OC4	<---	Organizational commitment	0.645

The results of the final model confirmed hypothesis 3, that employee job satisfaction positively influences and has a significant direct impact on an employee's organizational commitment (γ = 0.755, ρ = 0.000, and β = 0.648). It indicates that job satisfaction goes up by 1, and organizational commitment goes up by 0.755. It suggested that "job satisfaction determines the level of commitment towards the organization, rather than vice versa" (Dobreva-Martinova et al., 2002). Employees are willing to be involved in the organization if they are satisfied with their jobs.

The model also supports hypothesis 1, that technostress creators negatively influence job satisfaction (γ = -0.454, ρ = 0.000, and β = -0.328). Surprisingly, the final model indicates that user involvement can actually increase employees' technostress (γ =0.198, ρ =0.001, and β = 0.309); this finding is different from previous literature (Tarafdar et al., 2010). The result also shows a new, strong linkage between user involvement and organizational commitment (γ =0.428, ρ = 0.000, and β = 0.415). Therefore, the result suggests that user involvement can add more technostress onto employees, but at the same time the more they are involved in the organization work the more they are willing to commit themselves to the organization.

7 Discussion

These days the fast development of ICTs has brought us convenience; it also has negative effects (Hung, Chang, & Lin, 2011). Aided by mobile computing communication devices and computer networks, users have the ability to quickly and easily access information and real-time information sharing with colleagues can happen anytime, anywhere. But this may force employees to feel always connected, respond to work-related information in real time and lose the control of their own time and space; this always create “urgency” (Brillhart, 2004). At the same time, many organizations undergo frequent re-engineering and process change, driven by ICT innovations and upgrades (W. Fisher & Wesolkowski, 1999). This forces employees to work harder and faster to cope with the work demand. Despite many benefits of using new advanced technology, employees often feel frustrated and distressed when they cannot adapt to complex technology in a healthy manner (Qiang et al., 2005). This technology-related stress is called “technostress”. In order to understand the phenomenon of technostress, and its negative effects at the individual level and its organizational outcomes, the primary focus of the current study was to develop and test a model, which aimed to investigate the relationship between technostress creators and organizational effectiveness. In addition, the study also identified a mechanism, which can potentially alleviate the negative effects of technostress.

7.1 Technostress Creators

The results of the current study indicate that technostress is a significant factor in predicting job satisfaction, which in turn to influences organizational commitment. The present model used the second-order technostress creator construct to explore the effects of overall technostress and the five sub-construct components on individual employees’ job satisfaction and organizational commitments. It provided a different result compared to similar studies carried out in the United States. The study by Tarafdar et al. (2010) found that techno-complexity (β = 0.75) and techno-insecurity (β = 0.69) are the top two influential factors in the technostress creators construct. These are in contrast to the present New Zealand-based result, which indicates that techno-invasion (β = 0.87) and techno-uncertainty (β = 0.79) are the top two influential factors. It shows that New Zealand employees appear to have the similar overall level of technostess in relation to IC as to their U.S.-based counterparts. However, U.S. employees tend to experience more task difficulty and job security concerns, while New Zealand employees are more likely to ambiguity about their role and performance expectation. The result can be further explained by the definition of technostress creators. The study by Ragu-Nathan et al. (2008) claimed that the construct of technostress creators was similar to other types of stress construct, such as role stress and task-based stress. Techno-complexity is similar to task difficulty (McGrath, 1976). Techno-insecurity creates the situation where employees feel threatened about job security due to the advanced ICT technology or by other people who have better technology skills (Tarafdar et al., 2007). Techno-uncertainty is similar to role ambiguity (Ragu-Nathan et al., 2008). And techno-invasion creates a situation where a blurring between work-related and personal life is the invasive effect of ICT (Tarafdar et al., 2007).

7.2 Job Satisfaction and Organizational Commitment

Job satisfaction refers to an overall evaluation or emotional state from one’s job experiences (Locke, 1976). Organizational commitment refers to the strength of an employee's attachment to a particular organization (Anton, 2009). Numerous studies have examined the relationship between job satisfaction and organizational commitment (Yousef, 2002). Previous research has found that job satisfaction and organizational commitment are the major predictors of turnover intention, absenteeism and job performance (Anton, 2009). Consistent with the previous studies (Harrison & Hubbard, 1998; Jamal & Badawi, 1995; Yousef, 2001), the current study shows those technostress creators are negatively related to job satisfaction. Job satisfaction appears to be strongly positively related to organizational commitment.

The direct effect structural model produced the result that technostress creators negatively impact organizational commitment. However, when the direct path from job satisfaction to organizational commitment was incorporated into the model, the relationship between technostress creators and organizational commitment became insignificant. In line with other similar studies, job satisfaction was found to fully mediate the relationship between technostress creators and organizational commitment (Anton, 2009; Yousef, 2002). The study found that technostress creators, as source of stress, directly and negatively influence job satisfaction. It suggests that employees who perceive a higher level of technostress tend to be less satisfied with the job and have less commitment to the organization. This is likely to result in negative consequences for both employees and organizations.

7.3 User Involvement

The results of the present study on user involvement are completely different from the proposed model. Previous literature claimed that user involvement, the situational variable in an organization, can potentially reduce the intensity and outcomes of technostress-creating factors and so further enhance employees' job satisfaction (Ragu-Nathan et al., 2008; Tarafdar et al., 2011; Tarafdar et al., 2010). However, the current study result indicated that user involvement is not significantly related to job satisfaction and is positively related to technostress creators. This result suggests that the more employees were involved in the work the more technostress they could experience. And user involvement has a very weak or no moderating effects on alleviating the negative effects of technostress on job satisfaction.

Some literature has reported a similar result. Ives and Olson (1984) claimed that "the benefits of user involvement have not been strongly demonstrated". One possible reason for this result is that user involvement is a complex concept; there is a complicated relationship between the type and degree of user involvement and other organizational and individual factors (Olson & Ives, 1981). User involvement can be generally categorized in two different dimensions: the first dimension is related to user attitudes and system use, which includes steering committees, sign-off on development stages, etc.; and the second dimension refers to process (Olson & Ives, 1981). The more employees are involved the more likely they are to develop very positive or very negative attitudes towards the ICT system (Barki & Jon, 1989).

One important factor for evaluating user involvement is the system quality (Barki & Jon, 1989). Involved individuals form positive attitudes toward the system only when the system is perceived to have high quality. Individuals may form very negative attitudes when they feel the system has very low quality (Barki & Jon, 1989). And if involved individuals perceive the system cannot provide value they are more likely to feel frustrated about it. Therefore, their overall technostress increases. Furthermore, when the company provides training for employees on the new system, employees have to spend large amounts of time and effort to learn and adapt to the new system, even sacrificing their personal lives. Employees may feel greater overall technostress in the short term. All the above reasons explain why highly involved employees may experience high technostress.

Furthermore, research by Kanungo (1979, 1982), suggest that there is no significant relationship between involvement and a variety of other emotional states, such as job satisfaction. For example, highly involved individuals may feel a high degree of job satisfaction with their work at a certain time and feel dissatisfaction at other times or under other conditions (Barki & Jon, 1989). Other researchers found a similar result; they explained that "highly involved employees are not necessarily happy with their jobs and angry people are often very involved with their jobs" (Barki & Jon, 1989; Guion, 1958).

The SEM modification index suggested a path drawing from user involvement to organizational commitment. This direct link was not expected from the initial hypothesis model. It indicated that user involvement was positively related to organizational commitment in this study. Although not expected in the present study this linkage has been discussed in previous research. Employees involved in the design process and specifications required, are more likely to understand the system and how it operates (Franz & Robey, 1986). That is; involved employees make the output information fit the organization better (Markus & Robey, 1983). Involved individuals have better chances to know organizational objectives and key issues (Byrd, Sambamurthy, & Zmud, 1995; Galliers, 1987). Furthermore, they can be more aligned with organization's mission and operations (Cerpa & Verner, 1998). Therefore, involved individuals are more likely to be more committed to the organization.

7.4 Theoretical and Managerial Implications

Advanced ICT technology, such as the Internet, mobile communication and wireless technologies have become essential in many aspects of our daily lives (Wang et al., 2008). However, a growing number of recent researchers have indicated the negative side of the technology advance (Fisher & Wesolkowski, 1999; Heinssen Jr, et al., 1987). The present study contributes to this emerging stream of Information System (IS) research, providing a conceptual model and empirically validating the idea of technostress in the organizational environment. Further, it investigates the relationship of technostress to individual employees' job satisfaction and organizational commitment. The majority of previous research has only examined the effects of technostress on the end user domain of ICT usage (Tarafdar et al., 2010). The current study, however, broadens the literature on technostress to more general psychological and behavioural aspects, such as overall job satisfaction and organizational commitment. This study also highlights the effects of user involvement on stress-creating conditions and employees' job satisfaction and organizational commitment.

Job stress has become one of the major negative reactions of individuals in today's dynamic life (Jamal, 2011). Cooper believes that "stress results from a misfit between individuals and their environment" (Cooper & Cartwright, 1994). Also, Luthans (2002, p. 702) states in his research that "when a person is confronted with a situation which poses a threat, and perceives that she or he does not have the capability or resources to handle the stressors, the imbalance that results at that point in time is termed as stress". As the importance of computer-related technology grows in our society, many employees are very likely to experience negative perceptions or emotions in interactions with those technologies, due to increased work load and pressure, lack of control over the work situation, frequent knowledge updating and the concern of job security. Therefore, technology-related stress (technostress) has become an increasingly common job stress in the modern society. Many researchers believe that job-related stress can decrease job satisfaction in general (Cooper & Marshall, 1976; Jackson, 1983; Robbins, 2001). The increased level of job stress can lead to a reduction in job satisfaction and can negatively impact job performance.

The present study provides supporting evidence for Tarafdar et al.'s (2010) study, which found that technostress-creating factors can negatively affect an individual employee's job satisfaction and organizational commitment. This study also implies that the phenomenon of technostress could lead to negative consequences of job performance and organizational efficiency. While this area of research has not been extensively explored, as this is a relatively new research topic, previous literature mainly examined the U.S.-based survey results (Ragu-Nathan et al., 2008; Tarafdar et al., 2010). This study aims to increase our understanding of technostress by surveying New Zealand-based employees. It examines five aspects of technostress-creating conditions: ICT-related overload, complexity associated with ICT usage, ICT-related job insecurity, task uncertainty due to frequent ICT upgrades and the invasion aspects of ICT usage. Compared to the survey results of the same five aspects, the New Zealand-based results indicated the different levels of technostress on each of these five aspects and their impact on individual and organizational outcomes. This may be explained by the impact of national culture on organizational outcomes through the employee's work-related values and attitudes (Jaramillo, Mulki, & Marshall, 2005). National culture influences individual and organization through organizational design, management style, decision-making style, and work values and processes (Deshpande & Farley, 1999; Hofstede & Hofstede, 2005).

In addition, the findings of present study highlight the positive relationship between job satisfaction and organizational commitment. Organizational commitment is one of the broader organizational outcomes that have been considered as psychological attachment to the organizational situation (Glazer & Kruse, 2008). It is defined as the feeling of responsibility that employees have towards the mission of the organization (Qureshi et al., 2011). Previous researchers have shown some significant relationships between individuals' commitment and performance (Meyer, Paunonen, Gellatly, Goffin, & Jackson, 1989; Ostroff, 1992).

Previous studies have indicated that the measurement of job satisfaction is less stable than the organizational commitment measurement, as job satisfaction is only reflecting the immediate or short-term reactions to certain aspects of the work situation (Porter et al., 1974). Furthermore, job satisfaction can be affected by other factors, such as individual difference and situational characteristics (Locke, 1970). Highly committed employees usually hold strong beliefs and acceptance of the goals and values of that particular organization; they usually desire to retain their membership and are willing to make high levels of effort on behalf of the organization to help the organization succeed (Allen & Meyer, 1990; Jamal, 2011; Mowday, et al., 1979).

Jamal (2011) argued in his study that "organizational commitment may act as a moderator of the stress and performance relationship". Job stress is generated mainly by organizational factors, and employees with different levels of organizational commitment may have different perceptions about job stress (Ivancevich, Matteson, & Preston, 1982; Jamal, 2010). For example, because the rapid development of technology facilitates ICT applications, employees have to update their skills frequently, and they have to spend time and effort to cope with the new skills. In such a situation, commitment behaves as a cognitive and behavioural barrier to moderate technostress (Glazer & Kruse, 2008). Committed employees may want to spend time to cope with it, as well as removing this technostress. At the end, they may utilize their time in order to help them to perform at a reasonable level (Jamal, 2011).

This study suggests that performance measures with the same level of job stress will be different for individual employees according to their levels of organizational commitment (Jamal, 2011). Therefore, it is inadequate to focus on developing employees' job satisfaction only, because if employees' organizational commitment is low, then job satisfaction cannot be translated into performance (Zhang & Zheng, 2009).

The results of the current study indicate that technostress exists, and needs to attract more attention in the present technology-oriented work environment. There are number of potential implications of the above findings in relation to managerial practice. Previous research has suggested that, in order to combat job stress and its subset technostress, it is critical to get support from the top management level for all aspects of the programme in order to get their commitment and resources (Brillhart, 2004). It is important for organizations to understand what technology can do to them and to get a better insight into the dominant causes of technostress (Ayyagari et al., 2011). Top managers need to understand the employees' perceptions of the work conditions and their perceived stress level.

Previous studies have also suggested that by enhancing the perceptions of the system, usefulness and reliability can effectively reduce the stress generated by technologies (Ayyagari et al., 2011). This can be achieved by choosing or developing the system application that best fits organizational needs and that provides a friendly system user interface (Brillhart, 2004). Effectively communicating the characteristics of the new system or application can also help reduce the level of technostress (Ayyagari et al., 2011). The work overload perceptions by individual employees could then be reduced.

As discussed before in this study, uncertainty and complexity are other dominant stressors from technology. In this case, the organization needs to provide some hands-on practice opportunities to help employees overcome their anxiety. Also, the organization could provide formal or informal training within the organization or team to foster cooperation, to provide mutual support in dealing with the technostress (Brillhart, 2004). In addition, managers can implement organizational strategies or explicit work norms to release employees from the constant connectivity generated by technology. For example, managers have clear job expectations that relate to individual employees, and clear policies about work–home conflict and after-hour availability (Ayyagari et al., 2011). After that, employees may feel they can still keep part of their personal lives, to maintain the work life balance, then the overall techno-invasion factor reduce.

7.5 Potential limitations and Suggestions for Future Research

Certain limitations need to be considered while interpreting the results. First; a larger sample size will lessen the risk of biased results, and ensure sufficient numbers of valid questionnaires are collected within the time frame available for a Master's thesis project. Compared to previous similar studies (Ragu-Nathan et al., 2008; Tarafdar Tu et al., 2007), the sample of 215 in the current study was within an acceptable level. However, SEM is a large sample technique, which requires a minimum of 200 samples (Kline, 2010). This means that model estimation, descriptive statistics or hypothesis testing on a particular model or variables are appropriate when the sample size is not too small for the chosen estimation method (Lei & Wu, 2007). The appropriate sample size is generally dependent on model complexity, the chosen estimation method and the distributional characteristics of the observed variable (Kline, 2010; Lei & Wu, 2007). Therefore, the small sample size may have a sample size sensitivity issue and reduce the statistical power of this study with non-central chi-squared distribution (Arbuckle & Wothke, 1999). In order to reduce such bias, several statistical analysis techniques have been applied to this study; these include the data reliability and validity test, and data transformation to assess data distribution normality. A variety of alternative goodness-of-fit indices have been assessed to supplement the chi-square statistic. All of the above techniques attempt to adjust for sample size bias. In addition, due to the small sample size, it was not practicable for this study to use the research method recommended by Breckler (1990), which randomly divides the sample into different subsamples. Therefore, this suggests that future studies need to apply a reasonably large sample.

There are some potential methodology concerns in the study. First, the questionnaires were made available online, rather than distributed to selected individuals; participants could choose to participate or not. There is, therefore, a respondent self-selection issue, with the possible result that only those participants who perceived a high level of technostress were interested in participating in the questionnaire (Tarafdar et al., 2010). Second, the use of self-reporting questionnaires possibly introduces socially desirable responses from participants (Bryman & Bell, 2007). Furthermore, the research results were based on cross-sectional, designed survey data, from which it is theoretically not appropriate to draw definitive conclusions about causality. Potential for common method bias still exists in this research even after certain procedures adopted to assess it; such as Harmon's single factor test, CFA and the marker factor method. This issue could be minimized to some extent with the use of longitudinal studies. This study measures technostress before and after implementing a particular technostress inhibitor (Ragu-Nathan et al., 2008).

Moreover, findings of the present study highlight the complex nature of user involvement. Results from the present study suggest that user involvement adds more technostress to employees, but at the same time the more they are involved in organizational work the more they are willing to commit themselves to the organization. As concluded by Olson & Ives (1981, p. 183), “user involvement is a more complex concept, there is a complex relationship between the type and degree of user involvement and other organizational and individual factors”. Employees get involved from initial system planning through to implementation; this can certainly help employees to become more familiar with the system’s functionality and capability in the long term. But, in the short term, employees have to spend a large amount of time dealing with the increased workload and complexity of the new system. Therefore, employees may experience a high level of technostress at the beginning; after they are familiar with the new technology they are more likely to finish their work efficiently, and so their overall technostress would decrease (Qiang et al., 2005). It would be valuable for future studies on user involvement to apply a more systematic approach, such as a longitudinal study with a large sample size.

For future study in this area with a relatively large sample size, it would be useful to understand whether levels of technostress differ across individual characteristics. This information could help organizations more efficiently deliver their stress-relieving strategies. Four demographic variables could be examined to generally evaluate individual differences; gender, age, education and computer confidence, because all these variables could influence an individual's perception towards ICT usage in his/her work. For example, it is commonly believed that more educated employees would have fewer problems learning a new ICT system and would learn faster than less educated employees. With respect to gender, people tend to agree that women find technology less easy to use than men (Ong & Lai, 2006), and tend to have higher computer anxiety (Igbaria & Chakrabarti, 1990; Whitley, 1997). Employees with different levels of computer confidence may perceive different levels of technostress (Qiang et al., 2005). Employees with higher computer confidence tend to have lower computer anxiety and technology phobia (Compeau & Higgins, 1995).

Finally, future studies should extend these findings by exploring the relationship between technostress and role stress. The findings would lead to a better understanding of the transaction-based stress model. Under the general influence of technology, organizations have undertaken changes in several aspects, which include departmental structures, business process, control process, standardization of rules and the extent of centralization/decentralization (Perrow, 1967; Thompson, 1967; Woodward, Dawson, & Wedderburn, 1965). Under such changes, roles are not static, but are "emergent" or "dynamic" (Perrone, Zaheer, & McEvily, 2003), as technology possibly changes organizational tasks and skills (Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2007). ICT mediates conditions of work and, further, change the task-related aspects of an employee's role (Tarafdar, Tu, Ragu-Nathan, &

Ragu-Nathan, 2007). Based on the above evidence, it is obvious that ICTs could have strong effects on organizational roles.

8 Conclusion

Today, accelerated ICT technology development has fundamentally changed both our professional and private lives (Hoffman et al., 2004). ICTs enable people to be connected anywhere, any time. By adopting ICTs, organizations have undertaken changes in several aspects, such as the nature of work, organizational structure and behaviour, business and control processes and communication between people, as well as management and leadership style (Bradley, 2000; Ragu-Nathan et al., 2008). The evolution of ICT has brought numerous potential benefits to the organization in terms of operational cost reduction, higher work productivity and efficiency and labour savings (Dos Santos & Sussman, 2000).

However, a growing number of researchers have indicated that ICT is changing the organization in diverse and unexpected ways (Abramson et al., 2005; Fisher & Wesolkowski, 1999). New systems are constantly and frequently being introduced to the organization, and they are becoming more and more complicated. Organizations have to continuously re-engineer their processes, driven by the new technology or technology upgrade. In this way, technology could potentially have a negative impact on individual employees and organizational efficiency; for example, employees may suffer technology-related stress, which is caused by an inability to cope with the demands of organizational computer usage (Fisher & Wesolkowski, 1999; Ragu-Nathan et al., 2008). The technology world will continue to advance; and organizations will continually introduce new technology to keep up with the competition. Employees may have to increase their daily interactions with ICTs, which may worsen the potential negative effects of ICT usage on individuals.

The present study contributes theoretical and practical knowledge to the literature on technostress. It has provided a conceptual model and empirical validation to the idea of technostress, as well as investigating its relationship to employee and organizational outcomes. In addition, this study also identified a mechanism that can potentially alleviate the negative effects of technostress. The structural equation modeling technique was adopted to examine the simultaneous casual relationships between technostress creators and other variables, which explain and predict organizational productivity.

Results from this study support previous findings that the technostress creator holds promise as a critical factor for predicting employee job satisfaction, which in turn influences the employee's organizational commitment. This provides further empirical evidence for the validity and reliability of the technostress construct in the organizational environment. This study extends the research on technostress to the general psychological and behavioural domain, which is the context extent of the ICT end user domain. The study also provides further evidence for the mediating effect of job satisfaction in the relationship between stress and organizational commitment. Furthermore, this study highlights the apparent complex nature of user involvement. The commonly held belief is that user involvement may have a potentially positive impact on technostress. However, it is less straightforward to apply in the organization, because "there is a complex relationship between the type and degree of user involvement and other organizational and individual factors" (Olson & Ives, 1981).

The results from this study have suggested a number of managerial implications that could be considered when developing an organizational strategy to reduce technostress and improve productivity in an organization. First; the results suggest that organization should endeavor to conduct thorough and comprehensive technostress-reduction training programmes to help employees deal with this issue. The results also suggest that, the total support and commitment of top management is critical in any strategy to reduce technostress and improve productivity.

The current organizational development trend requires an increase in the level of user dependence on ICTs, which results in employees having to finish more work in less time. ICTs can change our ways of work, and eventually our behaviour, in ways that we do not fully understand (Ragu-Nathan, et al., 2008). More and more researchers exploring various aspects of user attitudes or behaviours towards ICT in the workplace (Ahuja & Thatcher, 2005). Technostress is an inevitable aspect of ICT usage in organization. This research used New Zealand-based data only to develop the conceptual model and empirical understanding of technostress and its outcomes. It is hoped that it has contributed to the understanding of technostress as well as adding a valuable contribution to future studies in this area in New Zealand.

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Appendix A: Survey Questionnaires

MASSEY UNIVERSITY MASTER THESIS RESEARCH

By: Kelly Qiu

This survey is being completed as part of my Master Thesis Research at Massey University

The purpose of this questionnaire is to understand the technology related stress and its impact on employee's job satisfaction and organizational commitment.

Employees who work full time or part time in the organization and use computer or mobile technology at work can fill in this questionnaire.

The questionnaire will take no more than **5 minutes** to complete and is **completely anonymous**. All results are confidential and will only be used for the purpose of this research. No individual candidate can or will be identified and participation is voluntary. Participants can withdraw from the survey anytime they prefer.

If you require more information about this survey and your involvement you can email me on kellyqw0715@gmail.com.

Additionally, you may direct any questions or concerns you may have to my supervisor: Dr Darryl Forsyth, Email: D.Forsyth@massey.ac.nz

This research project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researchers name above are responsible for the ethical conduct of this research.

Any questions or complaints about the ethical conduct of this research may sent to Professor John O'Neil, Director (Research Ethics), Telephone: 06 350 5249, Email: humanethics@massey.ac.nz

Thank you in advance for your participation!

Part 1 Survey questions

Technostress creators

Techno-overload

1. I am forced by technology to work much faster
2. I am forced by technology to do more work than I can handle
3. I am forced by technology to work with very tight time schedule
4. I am forced to change my work habits to adapt to new technologies
5. I have to spent a lot of time everyday reading an overwhelming amount of e-mail messages

Techno-invasion

6. I spend less time with my family due to technology advancement

7. I have to be in touch with my work even during my vacation due to technology advancement
8. I have to sacrifice my vacation and weekend time to keep current on new technologies
9. I feel my personal life is being invaded by technology advancement

Techno-complexity

10. I do not know enough about ICTs to handle my job satisfactorily
11. I need a long time to understand and use new technologies
12. I do not find enough time to study and upgrade my technology skills
13. I find new recruits to this organization know more about computer technology than I do
14. I often find it too complex for me to understand and use new technologies

Techno-insecurity

15. I feel constant threat to my job security due to new technologies
16. I have to constantly update my skills to avoid being replaced
17. I am threatened by coworkers with newer technology skills
18. I do not share my knowledge with my coworkers for fear of being replaced
19. I feel there is less sharing of knowledge among coworkers for fear of being replaced

Techno-uncertainty

20. There are always new developments in the technologies we use in our organization
21. There are constant changes in computer software in our organization
22. There are constant changes in computer hardware in our organization
23. There are frequent upgrades in computer networks in our organization

Technostress Inhibitor

User Involvement

1. We are encouraged to try out new technologies in our organization
2. We are rewarded for using new technologies in our organization
3. We are consulted before introduction of new technology in our organization
4. We are involved in technology change and/or implementation in our organization

Job satisfaction

1. I like doing the things I do at work
2. I feel a sense of pride in doing my job
3. My job is enjoyable

Organizational commitment

1. I would be happy to spend the rest of my career in this organization
2. I enjoy discussing my organization with people outside it
3. I really feel as if this organization's problems are my own
4. This organization has great deal of personal meaning for me

Part 2: demographic questions

1. What is your gender?

    1. Male

    2. Female

3. What is your age?

    1. Under 20

    2. 20-30

    3. 31-40

    4. 41-50

    5. 51-60

    6. Above 60

4. What is your education level?

    1. High school

    2. Two years college

    3. Bachelor’s degree

    4. Post-graduate level

    5. Doctoral

    6. Others

5. Please indicate your “computer confidence” level. (measures on a 10-point scale from (1)-Not at all confident to (10)-Totally confident)

Appendix B: Characteristics of Participants

Gender	Response	%
Male	75	35%
Female	150	65%
Total	215	
Age	Response	%
Under 20	0	0%
20-30	67	31%
31-40	49	23%
41-50	49	23%
51-60	34	16%
Above 60	16	7%
Total	215	
Education	Response	%
Below high school	0	0
High School	23	11%
Bachelor's degree	86	40%
Post-graduate level	99	46%
Doctoral	7	3%
Total	215	
Computer Confidence	Mean	Standard Deviation
Measured on a 7-point scale from 1(very bad) to 7 (very good)	5.73	0.9