Managing The Risk Of Overusing Mobile Phones In The Working Environment: A Study Of Ubiquitous Technostress

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MANAGING THE RISK OF OVERUSING MOBILE PHONES IN THE WORKING ENVIRONMENT: A STUDY OF UBIQUITOUS TECHNOSTRESS

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Abstract

Despite the advantages IT has brought to the users, it can also invisibly produce negative impacts at the same time. There have been many cases in recent years showing that mobile technology users receive various kinds of negative feelings due to the ubiquitous nature of this technology. The purpose of this study is to propose a notion termed “ubiquitous technostress” which is the stress caused by over using mobile technologies. Based on a review of the literature, a model of the creators and consequences of ubiquitous technostress in organizations is formed in order to help managers better understand the causes and consequent effects of this particular type of stress. A survey was conducted on employees who use mobile phones routinely in their work, and 714 questionnaires were received that included 622 valid ones. Through the empirical results, we found that ubiquitous technostress creators have a positive effect on employees’ job stress, yet a negative effect on their productivity. Stress inhibitors (stress management training, job control, organizational rewards) do not have an effect on employees’ job stress but on their productivity. When employees feel stressed the most negative impact will be on their productivity. This study suggests that ubiquitous technostress does exist in organizations and has an invisible impact on employees.

Keywords: Mobile technology, Ubiquitous technostress, Job stress, Productivity, Transaction-based model
1 INTRODUCTION

Mobile devices are the equipment that can be utilized by users in the condition of movement and are with abilities of symmetry and asymmetry connection to the Internet or networks (Garofalakis & Stefanis 2007). Such devices are occasionally treated as technology for creating an extension of the working environment because the device users can complete their work related tasks even outside their work place (Venkatesh & Vitalari 1992; Duxbury et al. 1996; Duxbury et al. 2005; Middleton & Cukier 2006). Owing to its portability, the use of mobile technologies can overcome the physical constraints in traditional business interaction, that is, meeting together or communicating through mails. Organizations can extend their business contact onto any mobile equipment that is network accessible, particularly, the Internet enabled devices. Mobile devices include various kinds of information technology (IT) consumer products, such as mobile phones, personal digital assistant (PDA), laptops, tablet personal computer (Tablet PCs), and pocket PCs. The functions have evolved from simply supporting voice transmission to voice exchanging, data, and videos, and their usability is much enhanced.

While the evolution of IT has brought numerous positive benefits to the practical world, it also brings negative impacts imperceptibly to the users. This can be testified by an increasing number of cases of mobile phones or IT impacting users negatively in recent years, for example, a psychological disease creating various kinds of anxiety related to the use of mobile phones was found (Wikipedia 2010), and a series of suicide cases in a French telecommunication company were reported in the public press (Hartley 2009). Such cases show that users can receive negative impacts due to the ubiquitous nature of mobile technologies. Not only from the practical world, but also from the past academic studies, a number of researchers have mentioned that the utilization of IT can produce negative influences upon users, for example, from the perspectives of computer anxiety (Cambre & Cook 1985), Internet anxiety (Presno 1998), and technostress (Weil & Rosen 1997; Brillhart 2004; Ragu-Nathan et al. 2008). These studies focus on the stress created when utilizing IT and found that stress not only impacts on the employee’s psychological status, but also creates job dissatisfaction (Ragu-Nathan et al. 2008). Given previous mentioned facts and findings, this study believes that the use of mobile technologies to support their working tasks.

The research on previous mentioned ubiquitous technostress is absent in the prior literature on stress and technostress. This study, based on previous literature, tries to identify the ubiquitous technostress creators, and further, test how they impact on job stress and individual productivity. To achieve this objective, our focus is on mobile phones because this technology gives high ubiquity to users and is the most popular and prevalent one among all kinds of mobile technologies, such as laptops, and global positioning systems (GPS). The object of study is the employees who utilize mobile phones for their work purposes. This study attempts to answer the following questions:

- Does ubiquitous technostress exist in organizations?
- If it does, how will ubiquitous technostress impact on job stress and productivity?
- What stress inhibitors are effective to reduce the negative effects of ubiquitous technostress on job stress and productivity?

2 LITERATURE REVIEW

2.1 Negative Effects of Information Technology

In recent years, while the rapid development of IT has brought convenience, it has also caused four commons negative effects. The first is computer anxiety. Harrington, Elroy, and Morrow (1990) termed the negative psychological status when people have aversion or rejection towards the use of...
computers as computer anxiety or computer phobia. Cambre and Cook (1985) defined computer anxiety as the feelings of worries, fear, or incompetence experienced by users when they use or even anticipate using computer technologies. Computer anxiety is found to be a source of negative impact on organizational performance (Desai & Richards 1998).

The second is Internet anxiety. One major reason for causing Internet anxiety is that users need to learn new languages and applications in a short period of time (Macaulay 2003). Another is the fear of dealing with unforeseen circumstances, contacting strangers, or being involved in a variety of risks (e.g. viruses and spyware). Presno (1998) clarified four types of Internet anxiety: Internet terminology anxiety, net search anxiety, Internet time delay anxiety, and general fear of Internet failure.

The third is technostress. Brod (1984) defined technostress as “a modern disease of adaptation caused by an inability to cope with new computer technologies in a healthy manner”. Weil and Rosen (1997) further defined the notion as the negative influence of attitudes, cognition, behavior, or mental state of mind after the user had made contact with a technology directly or indirectly. Tarafdar et al. (2007) developed and verified one which consists of five groups of factors to describe how technostress occurs in generic situations: techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. Tarafdar et al. (2007) also took a further step to examine what effects technostress can have on role stress and productivity, and the results show both relationships are negative. Ragu-Nathan et al. (2008) explored the effects on individuals and organizations of technostress based on a transaction-based model, and identified technostress creators and inhibitors. Technostress creators include techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. Technostress inhibitors are Technical support provision, Literacy facilitation, and Involvement facilitation. The study also reveals a negative relationship between technostress creators and job satisfaction and a positive relationship between job satisfaction, organizational commitment, and continuance commitment from technostress.

The fourth is mobile technostress. Yu et al. (2009) pointed out that mobile technostress comprises four components which are technology, stress, technostress, and mobile technology. The major concern with using IT is to have control of it. Users experience stress when they lose control, have a bad experience, or are unable to utilize it adequately. Four technology acceptance factors can be used for measuring the creation of mobile technostress: usefulness of technology, ease of use of technology, techno-accessibility of technology, and normality of technology. Their study shows that when there is interaction between human beings and technology, there is the potential for a negative impact. While technology empowers users with more abilities to handle tasks, mobile technostress surfaces if the users cannot find a balance between using and controlling the technology, particularly when they sense a loss of control.

2.2 Ubiquitous Technostress

Apart from the previous mentioned anxiety and stress caused by fear and struggle of use, this study discusses the stress derived from the ubiquitous nature of technology i.e. ubiquitous technostress. Since this is a newer notion of technostress, academic work on it is very rare but several practical examples can be seen. In past few years, a number of news reports have indicated that the ubiquitous nature of mobile technology has caused phone users to be negatively impacted emotionally. For example, the use of the Blackberry mobile phone has caused 45 suicide cases (22 succeeded and 13 tried unsuccessfully) in France’s Telecom because the employees have experienced much stress from using the mobile phone in replying to an overwhelming volume of emails and messages (Hartley 2009). The study done in the United Kingdom found that nearly 53 percent of mobile phone users in Britain tend to be anxious about being out of mobile phone contact which includes: running out of battery, being out of network coverage, or losing their mobile phone (Wikipedia 2010). This is called “Nomophobia”. It is found that several common negative effects of overusing mobile phones are, for example, stress, attitude towards suicide, and anxiety and nervousness (worry concerning outage of battery or loss of reception).

In order to understand the phenomenon of technostress, another study focused on the stress source of IT functions’ complexity. Liang and Wei (2004) were concentrated on two other characteristics of
mobile technologies. These were mobility and reachability. Reachability can be further divided into
detailed characteristics including ubiquity, convenience, instant connectivity, personalization, and
localization. Ubiquitous is the word that can be used to sum up these characteristics. In line with these
characteristics and prior literature, this study defines ubiquitous technostress as:

    The users of a mobile technology who are familiar with the current operating technology
    encountering specific stress caused by the characteristics of mobility and/or reachability of the
technology or suffering for a long period of time through continual connection with that
particular mobile technology.

2.3   Job Stress and Productivity

Job stress is the individual’s perception that his personal ability is not matched with the working
environment, and subsequently affects his mental and bodily health and behavior. Cox et al. (2000)
mentioned that job stress is conceptualized in physiology as the negative psychological status of
interaction between the human and working environment. It has become a “sideline product” of
modern society, and is among the critical issues to organizational employees since it affects the
routine of people’s lives as well as work efficiency.

The effects of job stress can be categorized into three types: the physiological (e.g. headache,
hypertension, heart disease and so on), the psychological (e.g. anxiety, depression, job dissatisfaction
and so on), and the behavioral symptoms (e.g. reduced productivity, absenteeism, taking leave and so
on). Wheeler and Riding (1994) found that job stress is a factor that can cause inefficiency, a high
turnover rate, absenteeism, poor work quality, increased healthcare spending, and low job satisfaction
to the organizations. Their study also shows that increasing job stress to employees will result in
lowering their organizational commitment.

Job stress is an important issue in organizations, impacting directly on employees, giving them
negative feelings which can result in low job satisfaction and reduced commitment to their work
(Parker & Decotiis 1983). Farnham (1991) conducted a study on job stress and found, surprisingly,
that 46% of the studied samples experienced stress and 34% even feel that the stress was high enough
for them to consider quitting the job. Excessive stress can not only create physiological symptoms in
employees, but the consequent effect of low productivity also indirectly increases costs for the
organization.

3   RESEARCH METHODOLOGY

3.1   Research Framework and Variables

The construction of this research model is based on the technostress studies of Ragu-Nathan et al.
(2008) and Tarafdar et al. (2007). Ragu-Nathan et al. (2008) mentioned that most of the past studies
used the transaction-based model as the basis of research on various kinds of psychological pressure
(Cooper et al. 2001; Keijsers et al. 1995; Lazarus & Folkman 1984; McGrath 1976). The major reason
is that the transaction-based model describes the symptoms generated from stress and the individual
responses to it. The transaction-based model comprises several major components which are stressors,
strain, situational factors, and other organizational outcomes. In line with prior studies and how Ragu-
Nathan et al. (2008) constructed their technostress related model based on the transaction-based
model, this research proposed the notions of ubiquitous techno-stress creators and stress inhibitors.
Figure 1 shows the research framework of this research. The ubiquitous technostress creators are the
concept of stressors in the transaction-based model, and the stress inhibitors are the concept of
situational factors in it. Job stress and productivity are the concept of strain in the transaction-based
model.
Figure 1. The Research Framework

This study selected suitable variables based on a review of the past literature, and these measurement items and definitions are shown in Table 1. All the variables in this study are measured by the Likert five-point scale (1 = strongly disagree, 5 = strongly agree) plus a sixth option “not applicable”.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Measure Items and Definitions</th>
<th>Related Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ubiquitous Technostress Creators</td>
<td>Techno-overload: Mobile technology makes employees work faster and work longer hours.</td>
<td>Brod (1984); Liang &amp; Wei (2004); Ragu-Nathan et al. (2008); Weil &amp; Rosen (1997); Yu et al. (2009)</td>
</tr>
<tr>
<td></td>
<td>Techno-invasion: Mobile technology users are on standby anytime and anywhere.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Techno-accessibility: The simple and easy access of mobile technology features.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Techno-dependency: Mobile technology users have a degree of dependence on mobile technology at work.</td>
<td></td>
</tr>
<tr>
<td>Stress Inhibitors</td>
<td>Stress management training: Help the stress management of staff and reduce the impact of stress.</td>
<td>Brillhart (2004); Cheng et al. (2003); Davis &amp; Gibson (1994); Fenlason &amp; Beehr (1994); Gefen et al. (2000); Godby &amp; Courage (1994); Karasek (1979)</td>
</tr>
<tr>
<td></td>
<td>Job control: The control of work content and job level for staff.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organizational rewards: Honors, promotions or rewards given to the staff for encouragement.</td>
<td></td>
</tr>
<tr>
<td>Job Stress</td>
<td>The negative psychological state produced by the interaction between the individual and their dynamic work environment.</td>
<td>Cox et al. (2000); Parker &amp; Decotiis (1983)</td>
</tr>
<tr>
<td>Productivity</td>
<td>The staff gain greater efficiency and the output is increased when using mobile technology at work.</td>
<td>Siegel, I. H. (1986); Torkzadeh &amp; Doll (1999)</td>
</tr>
</tbody>
</table>

Table 1. The Definition of Research Variables

3.2 Research Hypotheses

Duxbury and Higgins (1996) noted that communication technology can increase the workload of employees, and almost none of the studied subjects indicated that technology could reduce their work stress. Ironically, the same result also occurred in the samples of managers. Three-quarters of the managers agreed that technology does not reduce their work pressure but rather increases their workload. Tarafdar et al. (2007) found that in recent years, the usage of communication technologies has rapidly increased in the working environment. This gives more opportunities to generate more stress for employees in the work-place. Based on the above findings, organizational employees become more stressed when they use mobile technologies, and the increased stress can thereby affect the completion of work, or even increase the job stress. Thus, hypothesis 1 is proposed as:
H1: Ubiquitous technostress creators have a positive effect on job stress.

Prior research suggested that stress causes various kinds of effects to organizations, such as reduced productivity, increased work dissatisfaction, lack of involvement in work, and low job performance (Jackson & Schuler 1985; Kahn et al. 1964). Wheeler and Riding (1994) found that stress is a factor which can cause inefficiency, a high turn over rate, absence, low work quality, increased healthcare costs, and reduced job satisfaction. The Tarafdar et al. (2007) study also pointed out that technostress has a negative impact on productivity, and when employees feel higher technostress, there will be a productivity paradox. This means that if managers cannot effectively govern technostress, the expected productivity will be affected. Based on these findings, the stress in an organization will lead to reduced employee productivity and other results. Thus, hypothesis 2 is proposed as below:

H2: Ubiquitous technostress creators have a negative effect on individual productivity.

In this study, stress inhibitors are similar to the concept of the situational factors in the transaction-based model, which are able to reduce and relieve stress and also can minimize the factors that cause stress. Prior studies mentioned factors such as: job redesign, job adjustment, stress management training, work information sharing, social support, health plans, negotiation, assistance, and enhancing the job control (Davis & Gibson 1994; Jimmieson & Terry 1998; Karasek 1979) as means of reducing stress. McGrath (1976) mentioned that the factors that cause stress (stressors) will increase the consequences from personal burden (strain-related outcomes) while some of the mechanisms from the organization (e.g. situational factors) will reduce these consequences. Based on the idea in the transaction-based model and prior research, this study hypothesizes that the stress inhibitors can reduce the employee's job stress, and increase the employee’s productivity. Hypothesis 3 and 4 are shown as follows:

H3: Stress inhibitors have a negative effect on job stress.

H4: Stress inhibitors have a positive effect on individual productivity.

Past studies relating to the transaction-based model mentioned that situational factors have a negative moderating effect on the relationship between stressors and strain. Several studies also indicated that the mechanisms supplied from organizations (the situational factors), such as giving employees more control over their work (Karasek 1979), and providing more work-related information (Jimmieson & Terry 1998) are useful for moderating the relationship between stressors and strain. Cooper et al. (2001), Fenlason and Beehr (1994) also mentioned that there is a moderating effect on the relationship between stressors and strain if providing feedback and training. Yet, on the other hand, Ragu-Nathan et al. (2008) found that situational factors have an insignificant moderating effect on the relationship between stressors and strain. Thus, hypothesis 5 is proposed as below:

H5: Stress inhibitors have a negative moderating effect on the relationship between the ubiquitous technostress and job stress.

Prior literature has shown that job stress can cause health related problems to employees and consequently create problems for the organization, such as employee dissatisfaction, psychological problems, low productivity, absenteeism, and a high turn over rate (Beehr & Newman 1978; Parker & Decotiis 1983). For organizations, those negative outcomes include absenteeism, a high turn over rate, and low productivity. Dwyer and Ganster’s (1991) also mentioned that high stress in the work environment can generate significant costs, such as sickness, loss of time, and low productivity. Tennant (2001) found that work-related stress can negatively affect job satisfaction, productivity, physiological health, and mental health, and also stimulates absenteeism and other monetary costs. Based on the above literature, we conclude that job stress can affect productivity in many ways, and propose hypothesis 6 as follow:

H6: Job stress has a negative effect on productivity.

In line with the above hypotheses and corresponding measurements, the research model of this study is shown as Figure 2:
3.3 Data Collection

The employees in companies (e.g., administrators, real estate agents, and insurance sales people) and teaching institutions (e.g., school teachers, tutors, and lecturers) who have utilized the mobile phone for work purposes were chosen for this study. An electronic questionnaire was posted on many popular forums and academic bulletin boards to ensure a high response rate. The questionnaire was mainly posted on those sections on the forums and electronic bulletin boards, which are more relevant to the purposes of this study, such as, the technology, service, and finance industries. A pretested and pilot tested electronic questionnaire was posted onto the forums and electronic bulletin boards for 2 months in 2010. To ensure a high quality, the questionnaire included sleeper questions to identify respondents who were not suitable and possibly not understanding the meaning of the questions. After the samples were collected, each of them was examined in order to remove duplicate respondents, same-answers, wrong subjects (e.g., students), or the respondents who had never used a mobile phone for work. A sample of 714 questionnaires was totally collected. By removing 92 outliers in the Box Plot test, the usable samples were 622.

4 RESULTS DISCUSSION

The survey results show that more than two thirds of the sample are males (69.9%) and most of them have university/college degrees (68.5%) and are between the ages of 20 and 30 (78.8%). Almost one third of respondents are from the service-oriented industries including finance, insurance, telecom, real estate, and services (37.6%). The highest response rate falls into the category of bottom line managers in terms of the job level (72.0%) and under five years work experience. Moreover, mobile phones are utilized most frequently for contacting the company (84.6%) and communicating or negotiating with the customers/clients (71.9%). More than forty percent of the respondents use the mobile phone more than six times a day (41.6%). These results show that most of respondents are males, well educated, from the younger population and in the service-oriented industry. The mobile phone is used frequently for communicating with the company and its customers.

The exploratory factor analysis (EFA) was performed to examine the construct validity of the two proposed measurement dimensions—the ubiquitous technostress creators and stress inhibitors, followed by the Kaiser-Meyer-Olkin (KMO) test. The results show that the KMO values are 0.830 and 0.867 respectively. Since both values are higher than 0.5 and the results of the Bartlett’s test of sphericity is significant (significance = 0.000), the measurement tools of the two dimensions are
suitable for factor analysis. Then, the principal component analysis and the varimax of orthogonal rotation were conducted to help extract common factors (Hair et al. 2006). Prior to the analyses, this study divided the 622 samples randomly into two groups: 400 and 222, and used the first group for the EFA. The results showed that 15 (My job involves a lot of repetitive work) and 19 (On my job, I have very little freedom to decide how I do my work) were deleted and three factors each were extracted for the two dimensions—the ubiquitous technostress creators and stress inhibitors.

The confirmatory factor analysis (CFA) was performed after the EFA, and the measurements all passed the test. Then, the assessment of the measurement models were carried out to verify the structure of the four dimensions and the models fit based on the suggested thresholds (Gefen et al. 2000; Hair et al. 2006; Segars & Grover 1993). In total, the assessment included three steps. First, the samples (a: n=400) used in EFA were used for the first round of CFA. Second, the rest of the samples (b: n=222) in the other group acted as the holdout sample, and were used for the second round of analysis. Finally, all the samples (c: n=622) were used for testing the fit of the model according to its four dimensions. To ensure the best results in terms of the model fit, reliability, and validity, this study deleted the questionable items with highly correlated errors. The results of the adjusted measurement models of the ubiquitous technostress creators (Model 1), stress inhibitors (Model 2), job stress (Model 3), and productivity (Model 4) are shown in Table 2.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>X^2 &gt; 0.05</td>
<td>80.544</td>
<td>174.691</td>
<td>76.687</td>
<td>1.387</td>
</tr>
<tr>
<td>X^2/df &lt; 3</td>
<td>2.777</td>
<td>2.818</td>
<td>2.644</td>
<td>1.387</td>
</tr>
<tr>
<td>GFI &gt;= 0.9</td>
<td>0.973</td>
<td>0.958</td>
<td>0.976</td>
<td>0.999</td>
</tr>
<tr>
<td>AGFI &gt; 0.80</td>
<td>0.950</td>
<td>0.938</td>
<td>0.955</td>
<td>0.989</td>
</tr>
<tr>
<td>RMR &lt; 0.05</td>
<td>0.040</td>
<td>0.041</td>
<td>0.034</td>
<td>0.004</td>
</tr>
<tr>
<td>RMRSEA &lt; 0.1</td>
<td>0.053</td>
<td>0.054</td>
<td>0.051</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Table 2. Assessment of the Measurement Model

After the test of the first-order correlated measurement model, the results showed the remaining measurement items have acceptable factor loading values. The analysis of the correlation matrix of the samples shows all Pearson’s r values fall into the range from 0.002 to 0.601, and most of the values are positive. Moreover, the values of the correlation of the variables are all smaller than 0.8 which is the recommended maximum threshold for acceptance (Hair et al. 2006). This finding shows that the multicollinearity problem does not exist between variables. Table 3 presents the values of the composite reliability, average variance extracted (AVE), and correlation of the variables.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Reliability</th>
<th>AVE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ubiquitous technostress creators</td>
<td>0.89</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Technostress inhibitors</td>
<td>0.95</td>
<td>0.60</td>
<td>0.193***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Job stress</td>
<td>0.89</td>
<td>0.45</td>
<td>0.543***</td>
<td>0.072</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4. Productivity</td>
<td>0.90</td>
<td>0.69</td>
<td>0.131***</td>
<td>0.535***</td>
<td>-0.005</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3. Correlation of Variables

After the CFA, the verification of second order constructs was based on all samples (n=622) to analyze the paths and test the hypotheses. The results show that all paths have acceptable values except H3. The β value of H3 is -0.034; t value is -0.976; and the significance is 0.329 which falls
into the rejection level. This finding reveals that the stress inhibitors do not influence job stress significantly. Figure 3 shows the path analysis results.

This study adopted the hierarchical regression method to test the moderating effect of H5 existing between ubiquitous technostress creators and job stress. The first step was to calculate the mean centering values of the ubiquitous technostress creators and stress inhibitors, and to multiply the values for testing the moderating effect. Then, two levels of regression analysis were applied. The first level considered the mean centering values of the ubiquitous technostress creators and stress inhibitors as predictor variables and the values of coefficients $\beta_1$ and $\beta_2$ were used to test whether the two variables are correlated with job stress in the model. Then, the interactions of the two variables were considered to test the existence of a moderating effect. If the coefficient $\beta_3$ of the model in the second level analysis is statistically significant ($p<0.01$), the moderating effect exists. In terms of the interactions category, the coefficient $\beta$ is 1.358, the $t$ is 1.611, and the $p$ is 0.108 which is not statistically significant. This finding indicates that H5 is not supported and the moderating effect between the ubiquitous technostress creators and job stress from stress inhibitors is not significant.

![Figure 3. Results of Path Analysis](image)

Table 4 finally summarizes the results of the hypothesis test. In total, the results of the four hypotheses are considered significant based on the statistical analyses while two are not supported. Interestingly, although H2 is significant, it is a positive support which means that the ubiquitous technostress creators have a positive effect on productivity.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Content</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Ubiquitous technostress creators have a positive effect on job stress.</td>
<td>Yes</td>
</tr>
<tr>
<td>H2</td>
<td>Ubiquitous technostress creators have a negative effect on individual productivity.</td>
<td>Yes (Reverse)</td>
</tr>
<tr>
<td>H3</td>
<td>Stress inhibitors have a negative effect on job stress.</td>
<td>No</td>
</tr>
<tr>
<td>H4</td>
<td>Stress inhibitors have a positive effect on individual productivity.</td>
<td>Yes</td>
</tr>
<tr>
<td>H5</td>
<td>Stress inhibitors have a negative moderating effect on the relationship between the ubiquitous technostress and job stress.</td>
<td>No</td>
</tr>
<tr>
<td>H6</td>
<td>Job stress has a negative effect on productivity.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 4. Results of hypothesis test
5 CONCLUSION

This study found that the ubiquitous technostress does exist in organizations and it causes positive impact on job stress and employees' productivity directly. Apart from the direct effect, it also generates negative impact on employees' productivity indirectly through the mediation of job stress. The existence of the ubiquitous technostress is like a soldier in the camp. Even he is not working his shift, he still feels the stress from intangible sources all the time as long as he is there. This study suggests that providing training on stress management for employees, increasing employees’ control of the job, and providing rewards to them can effectively enhance employees’ productivity although these organizational mechanisms cannot reduce the creation of ubiquitous technostress statistical significantly.

This study focused on investigating the perceived ubiquitous technostress, the effect on job stress resulting from ubiquitous technostress, and how it impacts on productivity when the employee uses only one single mobile technology for work – the mobile phone. Because of the rapid advancement in mobile technologies, they are now widely adopted by many companies to assist their employees in the work environment. Future research can continue studying the effects of ubiquitous technostress by using other kinds of popular mobile technologies, such as text messaging, notebooks, and tablet personal computers (Tablet PCs). Moreover, the measurement on productivity used in this study was the perceptions of the respondent on job productivity and efficiency in terms of using mobile phones in the workplace, which is a relatively subjective way to measure productivity. Future research can consider more objective ways to measure productivity, such as a mathematical calculation of job output.

Second, one can seek more effective organizational mechanisms to reduce stress. The proposed stress inhibitors showed an insignificant effect on job stress and an insignificant moderating effect on the relationship between the ubiquitous technostress creators and job stress. Future research can identify more factors that are effective in reducing job stress and moderate the effect of job stress from ubiquitous technostress creators.

References


Weil, M.M. and Rosen, L.D. (1997). Technostress: Coping with technology @WORK @HOME @PLAY. New York: John Wiley & Sons.

