Examining the Role of Mindfulness in Mitigating Technostress and its Negative Consequences

A thesis submitted for the degree of Doctor of Philosophy

By

Athina Ioannou

Department of Information Systems and Computing,

Brunel University

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ABSTRACT

The proliferation and ubiquity of information technologies (ICTs) have transformed the working environment of organizations, making imperative the engagement of individuals with various technologies for the accomplishment of their work tasks. Although ICTs have offered significant benefits both to individuals and organizations, those advances have come with some costs. Recently, academic literature has shown an increased interest in the dark side or else the negative aspects of technology usage within the workplace, focusing on the stress that individuals experience due to the extended usage of ICTs called technostress. A considerable amount of literature has been published on the concept of technostress revealing its severe consequences on individuals, leading to huge monetary costs for organizations; however, few studies have investigated mechanisms for the alleviation of this phenomenon thus the need for further research is crucial. Addressing this call of research, the present study contributes to the technostress literature by adopting for the first time a mindfulness perspective. The current study aims to examine the role of mindfulness as an organizational mechanism that can mitigate the impact of technostress on individuals as well as alleviate its negative consequences. By following a mixed methods approach, the current study involved two phases; At first, a theoretical framework was developed, based on the transactional-based model of stress, in order to examine the influence of mindfulness on technostress as well as its impact on job related and IT usage related outcomes. By conducting a survey-based approach and exploring a sample of 500 working individuals, the developed model was validated through SEM analysis revealing that mindfulness constitutes a powerful mechanism that can effectively reduce technostress, increase job satisfaction while also enhance user satisfaction while utilizing ICTs for work tasks and improve task performance. During the second phase of the study, the thematic analysis of the collected data, derived from semi-structured interviews, validated the results of the quantitative analysis confirming the role of mindfulness in reducing technostress conditions; while also yielded deeper insights revealing a set of strategies that more mindful individuals deploy during technostress experiences. Overall, the current study enhances existing literature in the IS domain by revealing the valuable role of mindfulness in protecting individuals

against the negative impact of stressful events occurring due to ICT usage while also providing substantial practical implications; By introducing mindfulness programs for their employees, corporate and HR managers can significantly improve employees' work life, increase individual productivity and enhance overall well-being at work thus ultimately improving the business performance and overall success of the organization.

DEDICATION

I dedicate this thesis to my mother, for always believing in me

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DECLARATION

The following papers have been published (or submitted for publication) as a direct result of the research discussed in this thesis:

Ioannou, A. and Papazafeiropoulou, A., 2017. 'Using IT Mindfulness to Mitigate the Negative Consequences of Technostress'. Proceedings of the 23rd Americas Conference on Information Systems (AMCIS*)*.

Ioannou, A., Papazafeiropoulou, A. and Spanaki, K. (under revision). 'The Mindfulness Concept in Information Systems (IS) Literature: A Review'. 26th European Conference on Information Systems (ECIS*),* 2018.

ABBREVIATIONS

AGFI	Adjusted Goodness of fit Index
AMOS	Analysis of Moment Structures
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EFA	Exploratory Factor Analysis
GFI	Goodness of fit index
ICTs	Information Communication Technologies
IFI	Incremental Index of Fit
IS	Information Systems
IT	Information Technology
MAAS	Mindfulness Attention and Awareness Scale
NFI	Normed Fit Index
PNFI	Parsimony Normed Fit Index
RFI	Relative Fit Index
RMSEA	Root Mean Square Approximation
RMR	Root Mean Square Residual
SD	Standard Deviation
SEM	Structural Equation Modeling
SPSS	Statistical Package for Social Sciences
TLI	Tucker Lewis Index
x2	Chi square
x2/df	Normed chi square

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Chapter 1: Introduction

1.1 Background and Research Problem Statement

Information Technology (IT) has been vastly characterized in the academic literature as a double-edged sword (Liang and Xue, 2009; Maier, 2014) as it can offer considerable benefits but also cause negative consequences. The power and advances of Information Communication Technologies (ICTs) have provided significant benefits to individuals and organizations; enabling them to access, share and analyse huge amounts of information and data while also facilitating flexibility to employees by creating mobile working environments diminishing geographic and time barriers. While the proliferation of ICTs within the organizations has led to tremendous improvements in their performance and efficiency, those advances have come with costs. Recently, researchers have shown an increased interest in the negative aspects of ICT usage and especially on the stress caused by ICTs, called technostress. technostress refers to the stress experienced by individuals in organizations due to the extended use of ICTs. It is defined as 'a modern disease of adaptation caused by an inability to cope with new computer technologies in a healthy manner' (Brod, 1984, p. 16). According to Weil and Rosen (1997, p. 5), technostress can be described as 'any negative impact on attitudes, thoughts, behaviours, or body physiology caused directly or indirectly by technology'. Evidence shows that symptoms of technostress on individuals can include fatigue, loss of motivation, inability to concentrate, dissatisfaction at work and reduced productivity (Brillhart, 2004; Tu, Wang and Shu, 2005; Ragu-Nathan *et al.*, 2008; Saganuwan, Ismail and Ahmad, 2015) all of which are translated into huge monetary costs for organizations. It is estimated that workplace stress costs more than 300 billion dollars every year to US businesses due to decreased employee productivity, absenteeism and turnover (American Psychological Association 2010). As a result, it becomes apparent that

technostress has a profound impact on business performance and overall success of organizations and measures should be taken in order to mitigate this phenomenon.

A considerable amount of studies have been published on the phenomenon of stress in the academic literature. In the IS domain, research on the concept of technostress is still in its early stages (Tarafdar, Gupta and Turel, 2013). Most of the extant studies have mainly focused on the identification of the factors that contribute to technostress (Tarafdar *et al.*, 2007; Ragu-Nathan *et al.*, 2008) as well on the investigation of their antecedents (Ayyagari, Grover and Purvis, 2011). Furthermore, previous studies have investigated the impact of technostress on numerous organizational outcomes such as productivity, job satisfaction, organizational commitment and end user performance (Tarafdar *et al.*, 2007; Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Ayyagari, Grover and Purvis, 2011). Up to date, only a few studies have attempted to examine factors that can alleviate the consequences of this phenomenon. Organizational mechanisms such as literacy facilitation, technical support and involvement facilitation have been proposed as means that can alleviate the adverse impact of conditions that create technostress on individuals (Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010). However, the problem continues to exist in today's organizations and further research is deemed as crucial in order to identify additional potential ways that can effectively mitigate the negative aftereffects of technostress (D'Arcy, Gupta and Tarafdar, 2014).

One of the major factors that contributes to technostress within the workplace is information overload (Ragu-Nathan *et al.*, 2008; Ayyagari, Grover and Purvis, 2011). Individuals working simultaneously with various ICT applications are exposed to a higher amount of information than what they can efficiently handle and use (Ragu-Nathan *et al.*, 2008). Evidence has shown that information overload is positively related to technostress (Ayyagari, 2012); however recent research in IS has revealed that mindfulness can mitigate the negative consequences arising from information overload in organizations (Wolf, Pinter and Beck, 2011).

Mindfulness was introduced initially as a concept in psychology, presenting the idea of a dynamic, rich state of awareness, involvement and alertness. Langer (1992, p.289) was the first who introduced the mindfulness aspect in psychology and defined it as 'a state of conscious awareness in which the individual is implicitly aware of the context and content of information. It is a state of openness to novelty in which the individual actively constructs categories and distinctions'. Studies have shown that mindfulness practices can offer myriad of benefits to individuals such as lower stress and anxiety, increased mental clarity, improvement in memory and enhanced emotional intelligence (Davis and Hayes, 2011). Nowadays, large enterprises like Google, Twitter and Facebook have embraced mindfulness and offer mindfulness sessions to their employees aiming to enhance their cognitive abilities such as improving their performance, productivity and creativity (Chaskalson and Hadley, 2015). In the IS field, studies have investigated the concept of mindfulness mostly on IT innovation adoption, at the organizational level neglecting the individual level. To date, there is lack of studies empirically investigating the effects of individual mindfulness on the use of technology in the work environment.

According to Mindfulness All-Party Parliamentary Group (MAPPG, 2015) report, released by the UK government, new information technologies have created uncertainty and volatility in today's working environment, thus contributing to the already existent stress of individuals, leading to negative outcomes such as high absence rates and reduced productivity, costing over 70 billion pounds to UK organizations. Nevertheless, current research has suggested that mindfulness can act as a potential mechanism to alleviate workplace stress (MAPPG, 2015). The current project will explore the role of mindfulness as a buffer to the exposure of technostress stressors as well as evaluate its effectiveness in alleviating the negative consequences arising from technostress. As a result, the present project will evaluate the association of mindfulness with technostress aiming to alleviate the negative consequences arising from stress induced by ICT usage within the workplace. To the best of our knowledge, this is the first study to apply a mindfulness perspective on the phenomenon of technostress.

The contribution of the present study constitutes in the evaluation of the role of mindfulness in reducing technostress arising within the workplace as well as in alleviating the negative consequences arising from this complex phenomenon. The study will evaluate the effect of mindfulness both on the stress creating conditions and on selected job and ICT related outcomes. The present research explores, for the first time, the influence of mindfulness on the phenomenon of technostress.

1.2 Research Motivation

The motivation of the present study constitutes in the existence of several limitations and gaps in scientific knowledge that were identified both in the technostress as well as in mindfulness literature in the IS domain.

1.2.1 Limitations of previous research

Stress in organizations has been widely investigated in the academic literature in several disciplines such as Information systems, Management and Organizational studies. Although a considerable amount of literature has been published around the concept of stress, research in the IS domain on ICT induced stress or else called technostress is still in on its early stages (Tarafdar, Gupta and Turel, 2013; Yan *et al.*, 2013). Recently, studies in the IS domain have been focusing on the investigation of the concept of technostress by mostly examining its impact on numerous organizational variables such as productivity, organizational commitment and job satisfaction (Tarafdar *et al.*, 2007; Ragu-Nathan *et al.*, 2008; Khan and Rehman, 2013). Previous studies have suggested that organizational mechanisms such as literacy facilitation, technical support and involvement facilitation can reduce the impact of technostress on individuals (Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010). These mechanisms, or else called technostress inhibitors, have become the main focus of extant studies in IS literature

while there is a surprising paucity of research exploring further means that could alleviate the adverse aftereffects of technostress. As a result, it becomes apparent that in the IS domain there has been a scarcity of research investigating effective mechanisms that can mitigate the impact of technostress that individuals experience within the workplace (D'Arcy, Gupta and Tarafdar, 2014). Moreover, the majority of technostress studies have followed a quantitative approach using surveys while there is a surprising paucity of qualitative and multi method research studies (Fischer and Riedl, 2017; Tarafdar, Cooper and Stich, 2017). Further research deploying mixed methods investigations in the area of technostress has been deemed as crucial (Fischer and Riedl, 2017). Overall, extant IS literature on the phenomenon of technostress is focused on a very limited scope thus further research is considered crucial (Galluch, Grover and Thatcher, 2015).

Evidence shows that information overload is a major predictor of technostress (Ayyagari, 2012). Based on this notion, the present thesis proposes a theoretical framework that examines the role of mindfulness as a mechanism that can alleviate the negative consequences arising from technostress.

Mindfulness was initially introduced in the psychology field with a considerable amount of research having been published till today in health and clinical research domains. While mindfulness research has been rising in the medical field, in the IS domain it constitutes a relatively new concept that demands further investigation. Collective mindfulness was firstly introduced in studies in innovation management (Swanson and Ramiller, 2004) and then investigations in the relation of mindfulness and reliability in IT adoption in high reliability organizations followed (Butler and Gray, 2006). There is a growing body of literature that recognizes the importance of exploring the concept of mindfulness within the IS domain; Most of extant studies have been focusing on mindfulness at the collective level or else organizational level, while there is relatively a small body of research concerned with individual mindfulness. Empirical research on the concept of mindfulness at the individual level is limited, as the majority of extant research in IS has been conducted either at a theoretical level or using quantitative approaches while there is a surprising paucity of qualitative studies (Dernbecher and Beck, 2017). Moreover, existing research on

the role of mindfulness within organizational settings has focused mostly on the concept of collective mindfulness, neglecting the individual level (Dernbecher, Risius and Beck, 2014; Nwankpa and Roumani, 2014). As a result, it becomes apparent that it is crucial for more empirical research to be conducted examining mindfulness at the individual level within the workplace. Overall, the present research explores for the first time the influence of mindfulness, as a technostress inhibitor, on the phenomenon of technostress, aiming to alleviate its adverse aftereffects that individuals experience within the workplace.

As a result, the previously mentioned identified gaps create the motivation for this study to carefully examine, explore and investigate the above mentioned concepts and contribute to IS knowledge.

1.3 Research Question, Aim and Objectives

The overall aim of the present project is to evaluate the impact of mindfulness on technostress and its negative consequences within organizational settings. The present research contributes to the technostress literature by investigating this phenomenon from a mindfulness perspective that has not been adopted before. By developing a theoretical model that examines mindfulness as a potential buffer to the exposure of technostress stressors, this project aims to explore the mitigating effect of mindfulness on the factors that create technostress (stressors) as well as on its negative consequences. In other words, this project examines mindfulness as a potential variable of influence: 1) on stress creating conditions and 2) on selected job-centric and IT-centric outcomes.

The research question of the current study can be formed as: *"What are the effects of mindfulness on ICT induced stress (technostress) within organizational settings?*"

The overall aim of this study will be accomplished by fulfilling the following research objectives:

1. Gain a deep understanding of the phenomenon of technostress as well as the concept of mindfulness in IS literature.
2. Develop a theoretical framework examining the influence of mindfulness on technostress as well as on work related outcomes while also define the proposed hypotheses.
3. Empirically validate the developed framework by examining the relationship of mindfulness with the technostress stressors and the chosen job related and IT usage related strain variables so as to indicate the framework's value and utility.
4. Investigate in more depth the relationship of mindfulness and technostress by examining how mindfulness affects each one of the stressors.
5. Evaluate the role of mindfulness as a mechanism that can alleviate technostress and its negative consequences.
6. Enhance current knowledge in IS literature and provide managerial implications regarding the role of mindfulness as a mechanism that organizations can adopt towards improving individual outcomes and employees' well-being.

1.4 Research Design & Methodology

The current study followed a mixed methods approach including both quantitative and qualitative approaches. The researcher has chosen the mixed methods designed research, as the combination of quantitative and qualitative tools can reveal different aspects of the investigated phenomenon; quantitative methods offer a comprehensive understanding of the 'bigger' picture of the research problem at hand while qualitative methods provide information and insights that can reveal in-depth explanations of the investigated phenomenon. Several data generation methods and data analysis techniques were followed throughout the execution of the present study. The research design of the study is described below:

At first, an extensive literature review was conducted on the concepts of technostress and mindfulness, reviewing existing studies and research in order to get a deep understanding of the investigated concepts and provide the necessary theoretical foundation underlying the proposed theoretical framework of the study. The integrative literature review enabled the synthesis of extant literature leading to the development of the proposed conceptual framework of the study, examining the impact of mindfulness on technostress as well as its influence on job related and ICT usage related outcomes, and its proposed hypotheses.

The first phase of the study followed a survey-based approach in order to gather the necessary data that would enable the testing of the proposed framework. For this reason, an online survey instrument was developed; All questionnaire items were adopted from existing literature and more specifically from studies that have already confirmed the reliability and validity of the instruments. The online questionnaire was distributed to knowledge workers, or else working individuals using technology daily in order to complete their work tasks, aiming to test the hypotheses generated from the proposed theoretical model. Before the actual distribution of the survey, a pilot took place in order to check for the reliability and validity of the survey instruments. Overall, 500 individuals participated in the online questionnaire of the study, achieving a very good sample size required for deploying Structural Equation Modeling (SEM) in the data analysis stage. For the analysis of the quantitative data, at first the researcher performed the preliminary examination of the data, including detection of any missing data and outliers as well as normality, linearity and multicollinearity tests while also produced the descriptive statistics and demographics of the sample. Having ensured that the collected data meets the underlying statistical assumptions, the researcher proceeded to analyse the data through Structural Equation Modeling (SEM) using AMOS in order to test the hypotheses of the proposed theoretical model of the study.

Having completed the data collection and data analysis of the first phase of the study, the researcher proceeded to the second phase of the study conducting semi-structured interviews with 10 participants that had already participated in the quantitative part of the study. Following a qualitative approach, the researcher aimed

to validate or else cross check the findings derived from the quantitative phase thus using interviews as a means of achieving triangulation. The overall aim of the qualitative phase was to explore in depth the relationships of the investigated variables, mindfulness and IT mindfulness with technostress stressors, and more specifically investigate how does mindfulness affect each one of the stressors. The analysis of the semi-structured interviews was conducted with thematic analysis, revealing more insights into the relationship of mindfulness and technostress.

1.5 Research Contribution

The current project aims to assess the role of mindfulness in alleviating the exposure of technostress stressors as well as its negative consequences that arise within workplace settings. As a result, the developed outcome framework of the study examines the relationship of mindfulness with the conditions that create ICT induced stress and with the outcome strain. Both theoretical and empirical investigation will be undertaken, that will lead to the accomplishment of the overall aim of the study.

From a theoretical perspective, this research will benefit the academic community by contributing to two research domains, mindfulness and technostress. The current study will expand and enrich current knowledge in IS technostress literature by exploring the role of mindfulness in alleviating ICT induced stress as well as in enhancing job and ICT usage related outcomes thus signifying the profound impact of technostress on individuals' satisfaction and task performance. The outcome theoretical framework of the current study will offer the opportunity to future studies to conduct further research evaluating the impact of mindfulness on various additional work related outcomes. By examining the influence of mindfulness on technostress, the current research expands current mindfulness research in IS field as till today there is a surprising paucity of empirical research investigating the individual level of mindfulness. Also, the current study will generate valuable insights into the role of mindfulness within workplace settings and the benefits it can offer to organizations thus contributing to the mindfulness literature in the

Management field. Furthermore, the current study adds extensively in the under researched area of the concept of IT mindfulness and offers avenues of further research. To our knowledge, this is the first study that empirically examines the alleviating effect of IT mindfulness on technostress and its negative consequences.

From a practical perspective, this project will benefit managers and organizations by evaluating the overall impact of mindfulness on technostress and its negative consequences arising within the workplace. By understanding the influence of mindfulness on ICT induced stress, HR and corporate managers can introduce mindfulness programs for their employees and reap considerable benefits; improve employees' work life, protect them from the adverse effects of extended ICT usage while also increase individual productivity, performance and well-being at work. By adopting a mindfulness perspective and thus embedding training sessions in their organizational routines, organizations can use mindfulness as a powerful organizational mechanism that can reduce the huge monetary costs caused by technostress thus ultimately improve their business performance and overall success.

1.6 Scope of the research

The current research aims to contribute to the body of research investigating the negative aspects of technology usage and more specifically the adverse effects of technology induced stress on working individuals. By adopting a mindfulness perspective, this study examines the phenomenon of technostress and its negative consequences that arise within workplace settings. Although these sub domains of IS research may overlap with areas of the psychology discipline, the current research focuses on the IT context and aims to investigate technostress by focusing on the IS aspects of the phenomenon and applying a mindfulness perspective as a technostress inhibitor.

Moreover, it should be highlighted that the current study adopts a mindfulness perspective by investigating the effects of mindfulness as a trait that all people

possess, as noted by Brown, Ryan and Creswell, (2007) '.. mindfulness is […] an inherent capacity of the human organism'. As a result, in the current thesis mindfulness is depicted as a trait or else an individual quality.

1.7 Structure of Thesis

The structure of the thesis is presented in Figure 1-1. The structure of the current thesis will be divided into seven chapters as described in the following points:

Chapter 2: introduces the theoretical base of the current research. This chapter provides a comprehensive literature review of existing research on the investigated concepts of the current study, namely technostress and mindfulness. The literature review aims to provide an enhanced understanding of the impact of technostress on work related outcomes within organizational settings while also offer an in depth examination of the concept of mindfulness along with its benefits, in and outside of organizational settings. Also, this chapter presents a thorough overview of current research on mindfulness within the IS domain, presenting the concept of IT mindfulness.

Chapter 3: provides the theoretical basis for the development of the theoretical framework of the current study and for the proposed hypotheses. The chapter presents the developed conceptual model of the current study while also discusses the developed hypotheses supported by theoretical underpinnings from existing mindfulness and technostress literature.

Chapter 4: provides an analysis of the research design and methods of the current study. The chapter discusses the selected underlying research assumption of the current study as well as justifies and describes the selected research approach, data collection methods and data analysis techniques.

Chapter 5: presents the results of the in depth analysis of the quantitative data and qualitative data collected during the first and second phase of the current study. The

chapter presents the statistical analysis and testing of the theoretical framework and hypotheses as well as the thematic analysis of the qualitative data.

Chapter 6: provides a critical discussion and interpretation of the findings derived from the quantitative and qualitative analysis. The chapter discusses the findings and results of the current study in relation with the theoretical base and existing literature foundation and research on the areas of mindfulness and technostress.

Chapter 7: discusses the significance of the present research by presenting its theoretical and practical contributions. Also, the chapter presents the limitations of the current study and provides further research directions.

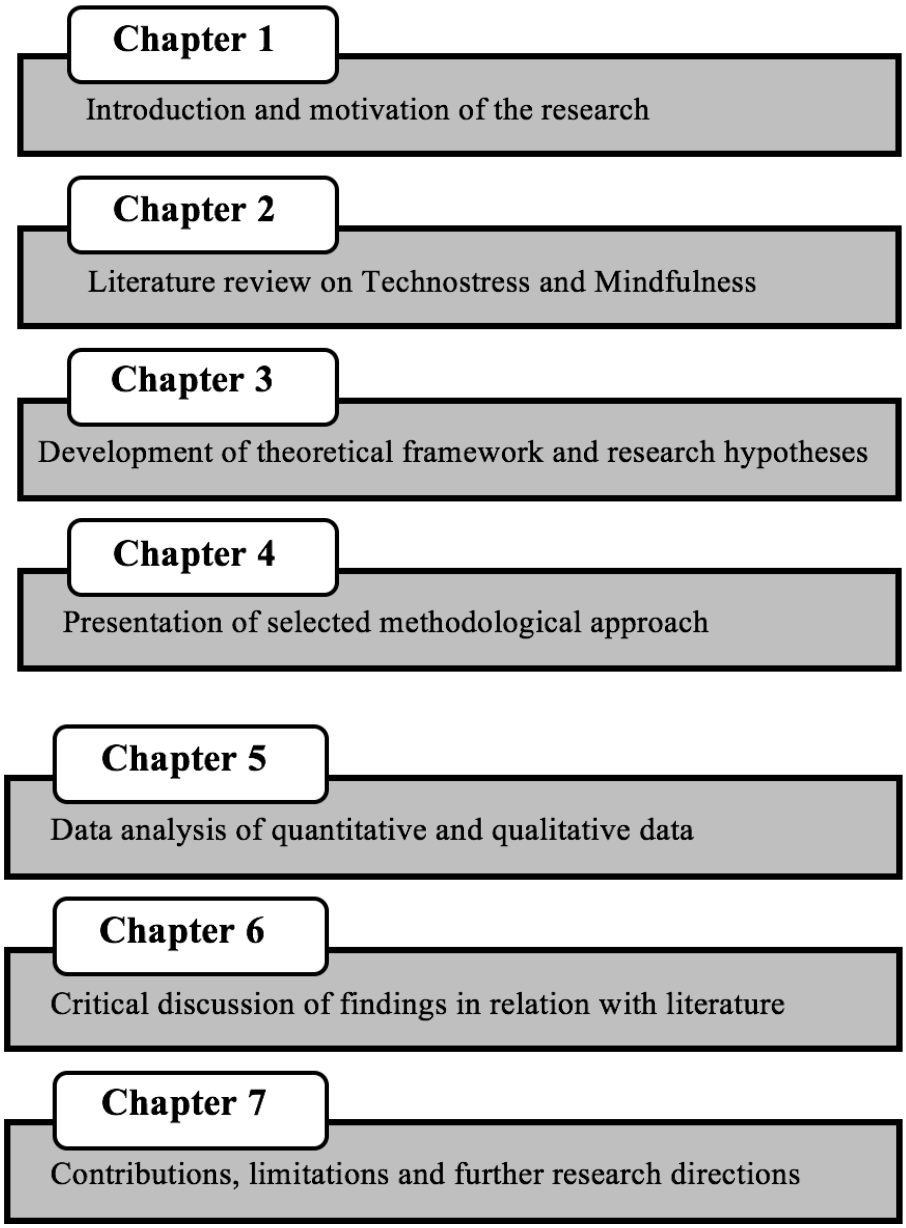

Figure 1-1 Structure of thesis

Chapter 2: Literature Review

2.1 Introduction

This chapter will delineate the theoretical concepts that will be used in the current thesis. The current research builds on literature findings from a variety of domains within and outside the IS field around the core concepts that are being investigated namely technostress and mindfulness. As Webster and Watson (2002, p.2) explicitly note 'because IS is an interdisciplinary field straddling other disciplines, you often must look not only within the IS discipline when reviewing and developing theory but also outside the field'. Moreover, as recently highlighted by Tarafdar, Cooper and Stich, (2017), the phenomenon of technostress is interdisciplinary in nature as it encompasses a link between IS literature and research in psychology and stress. As a result, the current review focuses on literature findings from the IS domain but also incorporates studies from Psychology, Business, Management and Computer Science in order to establish an overall enhanced understanding of the investigated concepts.

2.2 Technostress

Information Communication Technologies (ICT) have been extensively characterized in the academic literature as a double-edged sword (Liang and Xue, 2009; Maier, 2014; Ninaus *et al.*, 2015). The advances of Information Communication Technologies (ICTs) have provided significant benefits in communication, access and sharing of data and information enabling employees to accomplish tasks more effectively. Although the pervasion of ICTs in organizational workplaces has offered considerable benefits in terms of business performance and efficiency, these benefits are accompanied with negative aspects (Maier, 2014). The

negative effects of ICT usage have been studied in several disciplines such as Ergonomics, Business, Computer Science and Library Science (Jena, 2015). Emerging academic research in the IS field is focusing on investigating the areas around the concept of the adverse effects of ICT usage (Tarafdar, Gupta and Turel, 2013). Recently, a significant volume of published studies is focusing on the stress caused by ICTs in the work environment or else called technostress.

Stress has been broadly studied in several disciplines such as Psychology, Information systems, Management and Organizational studies (Yan *et al.*, 2013). Organizational stress has been a central area of interest in the academic literature for decades, since it constitutes an important aspect of business performance and overall success. According to Selye, (1974) stress is described as 'a set of physical and psychological responses to adverse conditions or influences' (Le Fevre, Matheny and Kolt, 2003, p. 727). Later on, the author differentiated between 'eustress' and 'distress', where the first term refers to situations where stress is perceived as a challenge or opportunity, else called as good stress, and the latter describing distress as stress that creates threats or hindrances (Tarafdar, Cooper and Stich, 2017). Having become the focus of research for numerous organizational studies across the decades, the broader construct of stress has been used as synonymous with distress, describing it as the result of the negative perception of stressors in the technology environment that impacts in a harmful way individuals and organizations leading to adverse consequences (Le Fevre, Matheny and Kolt, 2003). The majority of existing technostress literature has been investigating the distress aspect of stress, using the terms interchangeably. Grounded on existing technostress research, the current study uses stress from the distress perspective; as the research interest of the current study lies on exploring the dark side or else the negative aspects of ICT usage, focusing on examining the negative consequences of technostress on individuals within organizational settings.

Stress can disrupt the working environment and cause negative consequences in organizations that manifest in direct costs such as poor individual performance, health problems and high absenteeism as well as in indirect costs arising from poor decision making and communication problems (DeFrank, 2012). Technostress was defined for the first time in 1984 by clinical psychologist Craig Brody (1984, p.16)

as 'a modern disease of adaptation caused by an inability to cope with new computer technologies in a healthy manner'. A later definition states that technostress is 'any negative impact on attitudes, thoughts, behaviours or psychology caused directly or indirectly by technology' (Weil and Rosen, 1997, p. 36).

In today's organizational fully computerized work environments, individuals are obliged to work extensively with ICTs, depend highly on them and constantly adapt to new software and hardware updates. This rapid advancement of technology creates a significant difference between the knowledge that the employee currently possesses and the one needed by the ICT in use (Ragu-Nathan *et al.*, 2008). Furthermore, current ICTs create a sense of constant connectivity to individuals by extending the conventional work day through several ICT applications such as Internet, emails, mobile phones and instant messaging (Tarafdar, Pullins and Ragu-Nathan, 2015). In addition, multitasking, IT interruptions and information overload caused by the constant usage of ICTs within the workplace, introduce a new way of working demanding a higher load of information to be dealt within a shorter amount of time (Ragu-Nathan *et al.*, 2008). It becomes apparent that all previously mentioned situations create feelings to individuals of being unable to cope with technology thus leading to stress or else called technostress (Tarafdar *et al.*, 2007). Occurrences of technostress happen due to the rapid changes in ICTs as well as the uncertainty about one's ability to fully understand technology and use it effectively at work (O'Driscoll *et al.*, 2010). Overall, technostress is caused by the constant advancement of ICTs in the organizational workplace, forcing individuals to continuously adapt to the changing physical, social, cognitive requirements impeded by ICTs use (Tarafdar *et al.*, 2007).

Technostress affects individuals on psychological, physical, behavioural and even biological level (Agogo and Hess, 2015). The symptoms that an individual may exhibit range from fatigue, inability to concentrate and frustration to loss of motivation, dissatisfaction at work and burnout (Brillhart, 2004; Tu, Wang and Shu, 2005; Ragu-Nathan *et al.*, 2008). According to the American Psychological Association (2010), the costs of stress related outcomes within the workplace such as high absenteeism, productivity losses and increased employee turnover intention are estimated at 300 billion dollars in the US industry every year (Brillhart, 2004).

Similarly, in the UK respective costs range between 70 to 100 billion pounds (MAPPG, 2015). Therefore, it becomes apparent that technostress is a crucial issue for organizations that needs to be effectively addressed as it creates huge monetary and psychological costs both to businesses and individuals (Brillhart, 2004; Jena, 2015). These costs will continue to rise unless actions are undertaken that will moderate the consequences of this phenomenon (Brillhart, 2004).

2.2.1 Overview of existing studies in technostress literature

A small but growing body of literature has investigated the phenomenon of technostress across several disciplines such as Computer Science, Library Science, Psychology, Business and Engineering (Brillhart, 2004; Khan and Rehman, 2013; Salanova, Llorens and Cifre, 2013; Jena, 2015; Alam, 2016).

Although the concept of stress has been broadly investigated, in the IS domain academic research on the concept of technostress is still on its early stages (Ayyagari, Grover and Purvis, 2011; Tarafdar, Gupta and Turel, 2013; Yan *et al.*, 2013). In particular, the study of Tarafdar *et al.* (2007) constitutes the first paper that conceptualizes and empirically shapes the dimensions of technostress. Later, in their seminal study Ragu-Nathan *et al.* (2008) empirically validate the concept of technostress, the factors that create technostress namely technostress creators and the mechanisms that can reduce the impact of technostress or else technostress inhibitors as well as investigate its relationship with various work related outcomes. The main focus of extant technostress literature is on the causes and impact of technostress (Jena, 2015). Several studies have investigated the concept of technostress within various contexts and its impact on numerous organizational variables. The impact of technostress on several organizational outcomes such as productivity (Tarafdar *et al.*, 2007), job satisfaction (Ragu-Nathan *et al.*, 2008; Khan and Rehman, 2013; Kumar *et al.*, 2013) and organizational commitment (Ragu-Nathan *et al.*, 2008; Kumar *et al.*, 2013; Ahmad, Amin and Wan Ismail, 2014; Maier *et al.*, 2015) has been revealed. Also, a number of studies have suggested moderating variables such as literacy facilitation, technical support and involvement facilitation (Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Ahmad, Amin and Wan Ismail,

2014; Tarafdar, Pullins and Ragu-Nathan, 2015) as organizational mechanisms that can reduce the impact of technostress on individuals. In their investigation of the antecedents of technostress creators, Ayyagari, Grover and Purvis (2011) developed an extended theoretical model of technostress by identifying certain technology characteristics that have an impact on stressors and thus constitute predictors of strain. Moreover, the influence of personality characteristics on technostress creators has been examined (Srivastava, Chandra and Shirish, 2015) as well as the severe impact of information overload on technostress (Ayyagari, 2012). Furthermore, it has been demonstrated that high technology dependence increases the levels of perceived technostress on individuals (Shu, Tu and Wang, 2011). While most of the extant literature has examined the phenomenon of technostress in the context of general technology usage within the workplace (Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Ayyagari, Grover and Purvis, 2011; Tarafdar, Pullins and Ragu-Nathan, 2015), recently studies have emerged that attempt to explore its impact on mobile technologies (Hung, Chang and Lin, 2011; Lee, Jin and Choi, 2012; Yin and Davison, 2014), social networks (Maier *et al.*, 2015), ERP systems (Maier, Laumer and Weinert, 2015) and Accounting Information systems (Saganuwan, Ismail and Ahmad, 2015). Recently, studies have emerged focusing their attention on the dual nature of technostress by examining both its positive and negative impact on individuals but results are still ambiguous (Califf, Sarker and Fitzgerald, 2015; Tarafdar, Cooper and Stich, 2017). Regarding the methodological approaches followed by existing technostress studies, quantitative studies incorporating a survey-based approach with self-report measures are mostly dominant within this research area, while there is a surprising paucity of qualitative and multi-method research studies (Fischer and Riedl, 2017; Tarafdar, Cooper and Stich, 2017).

According to D'Arcy, Gupta and Tarafdar (2014), extant literature on the technostress phenomenon can be divided into the following categories: 1) conditions creating technostress or stressors, 2) mitigating factors or technostress inhibitors, 3) adverse effects of technostress on work life. The following sections follow this categorization.

2.2.2 Stressors

The conditions that create technostress are called stressors or else technostress creators. In their major study, Ragu-Nathan *et al.* (2008) identify and empirically validate the five conditions that create stress induced by the use of ICTs in the workplace and constitute in: techno overload, techno invasion, techno insecurity, techno uncertainty and techno complexity.

1. Techno overload describes situations where ICTs force individuals to work faster and longer. Large amounts and high rates of information available through multiple ICTs create information overload, a situation where the individual cannot process efficiently the excessive loads of information within a short period of time, leading to feelings of stress and anxiety (Edmunds and Morris, 2000; Tarafdar *et al.*, 2007). In addition, multitasking as well interruptions from multiple ICT applications pressure individuals to deal with several simultaneous tasks and incoming information thus creating tension and stress (Tarafdar *et al.*, 2011). 2. Techno invasion refers to situations where the individual feels "always connected", never being free of technology and can be reached anywhere and anytime due to the use ICTs such as mobile phones, emails and messages. As a result, the workday is extended and the individual feels being intruded in his private life thus exhibiting feelings of stress (Tarafdar *et al.*, 2007, 2011). 3. Techno insecurity describes situations where individuals feel threatened that they will lose their job either by other people who are more capable with new ICTs and possess better technological skills or by being replaced by new information systems (Tarafdar, Tu and Ragu-Nathan, 2010; Ahmad, Amin and Wan Ismail, 2014). 4. Techno uncertainty indicates contexts where individuals feel unsettled due to the constant changes and upgrades of technologies inside the organizational workplace. Individuals need to continuously learn and educate themselves with new technology skills in order to keep up with the updates and use efficiently the organization's ICTs to complete their tasks. This constant re-learning and adaptation process creates stress to individuals as they continuously feel that their current skills are rapidly becoming obsolete (Tarafdar *et al.*, 2007, 2011; Tarafdar, Tu and Ragu-Nathan, 2010). 5. Techno complexity refers to situations where individuals feel intimidated as well as

inadequate in terms of technology skills due to the perceived complexity of newly introduced ICTs within the workplace. Individuals need to spend time and effort in order to learn how to use new complex systems and applications as well as deal with computer crashes and errors. As a result, feelings of stress and frustration arise (Tarafdar, Tu and Ragu-Nathan, 2010; Chandra, Srivastava and Shirish, 2015).

Most of the extant technostress literature has utilized the previously mentioned taxonomy of stressors in order to reveal their impact on numerous organizational outcomes such as productivity (Tarafdar *et al.*, 2007), job satisfaction (Ragu-Nathan *et al.*, 2008; Jena, 2015), organizational commitment (Kumar *et al.*, 2013) and job burnout (Srivastava, Chandra and Shirish, 2015). In their interesting analysis Ayyagari, Grover and Purvis (2011) identify and analyse another set of similar stressors consisting of work overload, role ambiguity, job insecurity, work-home conflict and invasion of privacy. While a number of studies have utilized this latter classification of stressors (Schellhammer and Haines, 2013; Yan *et al.*, 2013; Lei and Ngai, 2014; Maier, Laumer and Eckhardt, 2015; Maier, Laumer and Weinert, 2015), the majority of academic literature on technostress has investigated the phenomenon by employing the set of stressors initially proposed by Ragu-Nathan *et al.* (2008).

2.2.3 Technostress Inhibitors

Several studies have examined the effects of mitigating factors on the phenomenon of technostress and workplace outcomes (Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Ahmad, Amin and Wan Ismail, 2014; Tarafdar, Pullins and Ragu-Nathan, 2015). Technostress inhibitors represent organizational mechanisms that can reduce the impact of technostress on individuals (Ragu-Nathan *et al.*, 2008). Although the concept of technostress has received a considerable amount of attention by the scholarly community, few studies have attempted to propose factors or mechanisms that can mitigate the consequences of the phenomenon. The majority of the extant studies have failed to make new propositions in this subject area and have been limited to examining the impact of technostress inhibitors on technostress mostly by adopting the mitigating factors initially proposed by Ragu-Nathan *et al.*

(2008): literacy facilitation, involvement facilitation and technical support provision (Tarafdar, Tu and Ragu-Nathan, 2010; Ahmad, Amin and Wan Ismail, 2014; Booker, Rebman and Kitchens, 2014; Fuglseth and Sørebø, 2014; Califf, Sarker and Fitzgerald, 2015; Saganuwan, Ismail and Ahmad, 2015; Tarafdar, Pullins and Ragu-Nathan, 2015).

Literacy facilitation describes mechanisms that encourage and support the sharing of ICT related knowledge amongst the various participants within the organization. Since literacy facilitation helps end users to understand the functionality of new ICTs as well as cope with their requirements, it reduces the levels of technostress (Ragu-Nathan *et al.*, 2008; Tarafdar, Pullins and Ragu-Nathan, 2015).

Involvement facilitation manifests in mechanisms that involve the participation of end users during the planning, development and implementation phases of ICTs so that individuals can provide feedback, state their requirements and learn about the functionality of new applications and systems before they are actually adopted (Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010). Therefore, by informing individuals prior the adoption and use of a new ICT about the potential changes, benefits and opportunities that it will bring along, the impact of technostress is decreased (Ragu-Nathan *et al.*, 2008).

Technical support provision refers to mechanisms that provide guidance, training, problem solving and general ICT support to end users in the organization (Ragu-Nathan *et al.*, 2008). As a result, individuals feel more secure, more comfortable and less stressed when using newly implemented systems and applications within the organizational workplace (Tarafdar, Pullins and Ragu-Nathan, 2015).

Evidence suggests that organizational mechanisms such as technical support and involvement facilitation reduce stressors' impact and increase user's satisfaction with the ICT in use (Tarafdar, Tu and Ragu-Nathan, 2010; Fuglseth and Sørebø, 2014), enhance organizational commitment (Ragu-Nathan *et al.*, 2008; Ahmad, Amin and Wan Ismail, 2014; Jena, 2015) increase job satisfaction (Ragu-Nathan *et al.*, 2008; Jena, 2015) organizational continuance (Ragu-Nathan *et al.*, 2008) and technology enabled performance (Jena, 2015) . Moreover, it should be noted that although there is substantial evidence on the direct mitigating impact of inhibitors on

technostress, previous studies have failed to empirically validate the moderating effect of inhibitors on the relationship between stressors and strain (Ahmad, Amin and Wan Ismail, 2014; Fieseler *et al.*, 2014).

Other than the mechanisms mentioned above, there have been few attempts in the literature to suggest different ways that can be utilized in order to counteract the negative effects of the technostress phenomenon. Innovation support describes mechanisms that encourage individuals to experiment and learn the ICT in use by taking risks, discussing and communicating new ideas or occurring problems and by providing incentives for learning (Tarafdar *et al.*, 2011; Jena, 2015). As a result, individuals become more familiar and educated with the ICT in use and thus decrease their perceptions of stress (Tarafdar, Tu and Ragu-Nathan, 2010; Tarafdar *et al.*, 2011) By providing innovation support, organizations can weaken the negative effects of ICTs usage. A more distinct approach can be found in the investigation of Fieseler *et al.* (2014) who analysed the role of leadership as an organizational mechanism within a salespersons' environment and demonstrated that leadership can act as a shield against the negative aspects of ICT induced stress by increasing job satisfaction and reducing work exhaustion. Furthermore, task technology fit has been proposed as a potential inhibitor that can reduce the negative aftereffects of ICT induced stress (Ayyagari, 2012). Also, evidence suggests that an individual can decrease his perceptions of technostress by improving his computer or technology self-efficacy (Shu, Tu and Wang, 2011; Tarafdar, Pullins and Ragu-Nathan, 2015). Similarly, it has been revealed that by increasing an individual's technology competence, the negative effects of technostress can be considerably reduced and technology innovation and technology performance can be boosted in an organization (Tarafdar, Pullins and Ragu-Nathan, 2015). At last, more recently it has been demonstrated that IT control, the perception that an individual has regarding his capability of performing certain IT use behaviours, can decrease technostress strain thus mitigating stressful IT use encounters (Pirkkalainen *et al.*, 2017).

Overall, it becomes apparent that there are limited studies exploring inhibiting factors in the technostress literature. Since the problem does not cease to exist in today's organizations, further research is deemed as crucial in order to discover more

effective ways that can be used in order to counteract the negative consequences of technostress on individuals within the workplace.

2.2.4 Effects of technostress on work related outcomes

The consequences of technostress can appear in several manifestations in both behavioural as well as psychological terms. The main focus of extant technostress studies is on identifying the causes as well its negative consequences on individuals within the workplace and its impact on organizational outcomes. Technostress manifests in numerous work related outcomes such as low job satisfaction, decreased productivity, high turnover intention and low organizational commitment.

Most of the literature has focused on revealing the adverse effects of technostress on individual productivity (Tu, Wang and Shu, 2005; Tarafdar *et al.*, 2007; Hung, Chang and Lin, 2011) organizational commitment (Ragu-Nathan *et al.*, 2008; Kumar *et al.*, 2013; Ahmad, Amin and Wan Ismail, 2014; Jena, 2015; Maier, Laumer and Eckhardt, 2015; Hwang and Cha, 2018) and job satisfaction (Ragu-Nathan *et al.*, 2008; Patel, Ryoo and Kettinger, 2012; Khan and Rehman, 2013; Kumar *et al.*, 2013; Patel, Kettinger and Ryoo, 2013; Yin *et al.*, 2014; Fieseler *et al.*, 2014; Califf, Sarker and Fitzgerald, 2015; Saganuwan, Ismail and Ahmad, 2015; Jena, 2015; Maier, Laumer and Eckhardt, 2015; Chen and Muthitacharoen, 2016) while fewer studies have examined its impact on turnover intention (Patel, Ryoo and Kettinger, 2012; Patel, Kettinger and Ryoo, 2013; Califf, Sarker and Fitzgerald, 2015; Maier, Laumer and Eckhardt, 2015), individual performance (Tarafdar, Tu and Ragu-Nathan, 2010; Jena, 2015; Tarafdar, Pullins and Ragu-Nathan, 2015; Chen and Muthitacharoen, 2016), end user satisfaction (Tarafdar, Tu and Ragu-Nathan, 2010; Fuglseth and Sørebø, 2014), job burnout and job engagement (Srivastava, Chandra and Shirish, 2015) and intention to extend to use IT (Fuglseth and Sørebø, 2014).

More specifically, the relationship of technostress and individual productivity has been empirically validated demonstrating that lower levels of technostress lead to higher levels of productivity in individuals within the workplace (Tarafdar *et al.*, 2007). Furthermore, evidence has shown that the conditions that create technostress

have a negative impact on job satisfaction (Ragu-Nathan *et al.*, 2008; Khan and Rehman, 2013; Kumar *et al.*, 2013; Jena, 2015) end user satisfaction (Tarafdar, Tu and Ragu-Nathan, 2010; Fuglseth and Sørebø, 2014; Chen and Muthitacharoen, 2016) individual performance (Tarafdar, Tu and Ragu-Nathan, 2010; Tarafdar, Pullins and Ragu-Nathan, 2015; Chen and Muthitacharoen, 2016) and innovation (Tarafdar, Pullins and Ragu-Nathan, 2015). Inconsistent findings have been reported on the effect of technostress on organizational commitment (Kumar *et al.*, 2013; Ahmad, Amin and Wan Ismail, 2014; Jena, 2015) with studies suggesting further research as crucial. Table 2-1 presents a concept centric summary of existing technostress studies.

Main Focus	**Concept**	**Key findings**	**Literature**
Causes	Technostress creators	Conceptualization of technostress, identification of conditions creating technostress	(Tarafdar *et al.*, 2007; Ragu-Nathan *et al.*, 2008)
		Identification of antecedents of stressors	(Ayyagari, Grover and Purvis, 2011)
Impact	Technostress inhibitors	Widely adopted technostress inhibitors: (1) literacy facilitation, (2) involvement facilitation and (3) technical support.	(Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Ahmad, Amin and Wan Ismail, 2014; Booker, Rebman and Kitchens, 2014; Fuglseth and Sørebø, 2014; Califf, Sarker and Fitzgerald, 2015; Saganuwan, Ismail and Ahmad, 2015; Tarafdar, Pullins and Ragu-Nathan, 2015)
		Computer self-efficacy can reduce technostress	(Shu, Tu and Wang, 2011; Tarafdar, Pullins and Ragu-Nathan, 2015)
		Empirical support on the mitigating effect of technostress inhibitors on individual outcomes: job satisfaction, org. commitment, org. continuance, user satisfaction, technology performance, intention to extend to use ICT.	(Ragu-Nathan et al., 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Ahmad, Amin and Wan Ismail, 2014; Fuglseth and Sørebø, 2014; Jena, 2015)

	Negative Impact of technostress on work related outcomes	Job satisfaction	(Ragu-Nathan *et al.*, 2008; Khan and Rehman, 2013; Kumar *et al.*, 2013; Jena, 2015)
		Organizational commitment	(Kumar *et al.*, 2013; Ahmad, Amin and Wan Ismail, 2014; Jena, 2015; Hwang and Cha, 2018)
		User satisfaction	(Tarafdar, Tu and Ragu-Nathan, 2010; Fuglseth and Sørebø, 2014; Chen and Muthitacharoen, 2016)
		Individual performance	(Tarafdar *et al.*, 2007; Tarafdar, Tu and Ragu-Nathan, 2010; Tarafdar, Pullins and Ragu-Nathan, 2015; Chen and Muthitacharoen, 2016).
		Intention to extend to use ICT	(Fuglseth and Sørebø, 2014)

Table 2-1 Concept centric summary of technostress literature findings

2.3 Theories adopted in technostress literature

2.3.1 Theoretical Models of Stress

According to Cooper, Dewe and O'Driscoll (2001) stress has been defined in several different ways throughout the academic literature either as a response, a stimulus, an interaction or as a transaction. Respective models consist in the response based model of stress which originates from medicine, the stimulus based definition of stress which originates from physics and engineering, the interactional approach and the transactional model of stress. Depending on the academic discipline and the specific research question of each study, different models are adopted (Cooper, Dewe and O'Driscoll, 2001). Specifically throughout the job related stress literature, the interactional approach has been predominately used in empirical studies while the transactional model was mostly adopted in theoretical studies (Cooper, Dewe and O'Driscoll, 2001).

In the IS domain, the vast majority of studies have adopted the Transaction model of stress in order to investigate and analyse the phenomenon of technostress (Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Hung, Chang and Lin, 2011; Fieseler *et al.*, 2014; Fuglseth and Sørebø, 2014; Lei and Ngai, 2014; Yin *et al.*, 2014; Srivastava, Chandra and Shirish, 2015; Tarafdar, Pullins and Ragu-Nathan, 2015).

According to the transaction-based approach, stress is 'a combination of a stimulation condition and the individual's response to it' (Ragu-Nathan *et al.*, 2008, p. 419). Stress does not reside in the individual nor in the environment but rather in the relationship between them (Cooper, Dewe and O'Driscoll, 2001). This ongoing transactional process, where the demands of the environment exceed the person's capabilities, is referred as stress (Cooper, Dewe and O'Driscoll, 2001; Fieseler *et al.*, 2014; Fuglseth and Sørebø, 2014). The transaction-based approach includes four major components: 1) stressors, which are the events, stimuli or conditions that create stress, 2) situational factors, which describe organizational mechanisms that can reduce the impact of stressors, 3) strain, that refers to the behavioural and psychological outcomes of stress such as job dissatisfaction and productivity and 4) organizational outcomes that are the work related outcomes such as turnover intention or absenteeism that are influenced by strain (Cooper, Dewe and O'Driscoll, 2001; Ragu-Nathan *et al.*, 2008). In many existing studies, strain and organizational outcomes are used interchangeably.

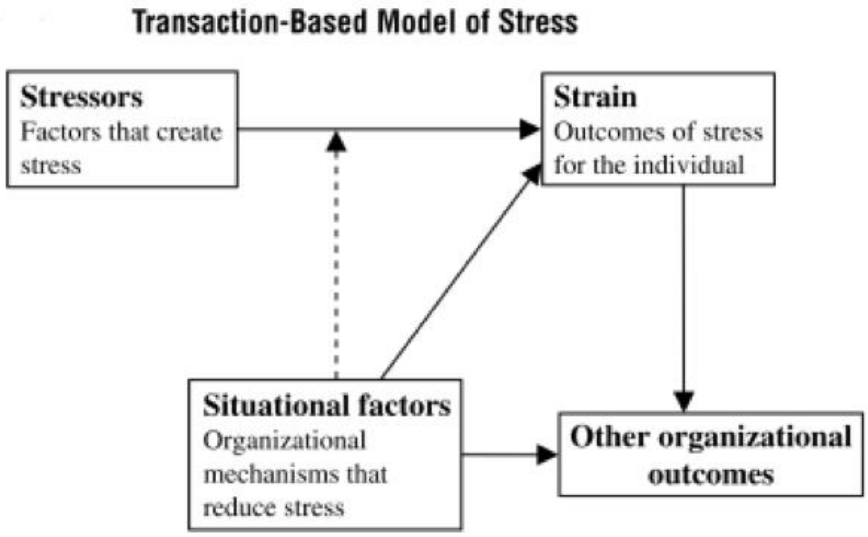

Figure 2-1 Transaction model of stress, source: Ragu-Nathan et al. (2008)

Various theoretical models of job related stress exist in academic literature such as the organizational stress cycle, the cybernetic model, the job demands - control model and the person-environment fit approach. The most prevalent one is considered the latter (Cooper, Dewe and O'Driscoll, 2001).

A considerable amount of studies examining the technostress phenomenon have used the person environment fit model of stress (P-E) (Ayyagari, Grover and Purvis, 2011; Yan *et al.*, 2013; Califf, Sarker and Fitzgerald, 2015; Saganuwan, Ismail and Ahmad, 2015). This model proposes that strain occurs when the relationship between a person and the environment is out of equilibrium. In other words, when there is a lack of fit between the characteristics of the individual and the environment, unmet job demands and unmet individual needs emerge leading to the occurrence of strain (Cooper, Dewe and O'Driscoll, 2001; Ayyagari, Grover and Purvis, 2011). Two types of misfits can occur: First, a misfit can occur between the values or desires of an individual and the available supplies of the environment that can fulfil these desires (Ayyagari, Grover and Purvis, 2011). Secondly, there can be a gap between the abilities of the person and the demands of the environment (Ayyagari, Grover and Purvis, 2011). The central notion of P-E fit is encompassed in most of the job related stress models (Cooper, Dewe and O'Driscoll, 2001).

Another theoretical model adopted in the technostress literature is the organizational stress cycle theory. Organizational stress cycle theory, which is comprised from three processes namely as appraisal, decision making and performance, the individual appraises the encountering situation and decides how to respond to it depending on his perception of the situation as negative or positive (Cooper, Dewe and O'Driscoll, 2001; Califf, Sarker and Fitzgerald, 2015). In their study, Califf, Sarker and Fitzgerald (2015) attempt to explore both negative and positive side of technostress by combining organizational stress cycle theory and cognitive behavioural approach. Also, in their studies examining the dual impact of IT, (Patel, Ryoo and Kettinger, 2012; Patel, Kettinger and Ryoo, 2013) have adopted an extension of the job demands – control model called job demands-resources model that is based on the general idea that job demands put pressures on individuals thus creating job strain while job resources buffer the effects of those demands.

2.3.2 Social Cognitive Theory

Along with the previously mentioned theoretical models that define stress either as a response, a stimulus, an interaction or as a transaction, a number of previous studies have adopted social cognitive theory in their endeavour to investigate the phenomenon of technostress and propose factors that can alleviate its impact on individuals.

According to social cognitive theory (Bandura, 1982), 'an individual's beliefs about how well they can perform a certain task shape their attitudes to that task'(Tarafdar, Pullins and Ragu-Nathan, 2015, p. 10). This belief is defined as self-efficacy and describes an individual's judgement of his own abilities to perform a task or behavior. Self-efficacy influences the choice of activities and settings, the degree of effort, the persistence of effort while also predicts performance and coping behavior (Bandura, 1977). More importantly, self-efficacy influences the feelings of stress and anxiety that an individual feels including thought patterns and emotional reactions (Shu, Tu and Wang, 2011). In the IS context, technology or computer self-efficacy refers to the belief of one's capability to use a computer in order to accomplish a task

(Compeau and Higgins, 1995). Previous studies in IS have adopted the concept of technology self-efficacy and proposed that it can alleviate the negative impact of technostress (Shu, Tu and Wang, 2011; Tarafdar, Pullins and Ragu-Nathan, 2015). Evidence has shown that technology self-efficacy can significantly decrease technostress (Shu, Tu and Wang, 2011) as well as moderate the relationship between technostress and sales performance (Tarafdar, Pullins and Ragu-Nathan, 2015).

Theory	Reference
Transaction-based approach	(Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Hung, Chang and Lin, 2011; Fieseler *et al.*, 2014; Fuglseth and Sørebø, 2014; Lei and Ngai, 2014; Yin *et al.*, 2014; Srivastava, Chandra and Shirish, 2015; Tarafdar, Pullins and Ragu-Nathan, 2015).
Person Environment Fit model	(Ayyagari, Grover and Purvis, 2011; Yan *et al.*, 2013; Califf, Sarker and Fitzgerald, 2015; Saganuwan, Ismail and Ahmad, 2015)
Organizational Cycle	(Califf, Sarker and Fitzgerald, 2015)
Job Demands- Control	(Patel, Ryoo and Kettinger, 2012; Patel, Kettinger and Ryoo, 2013)
Social Cognitive Theory	(Shu, Tu and Wang, 2011; Tarafdar, Pullins and Ragu-Nathan, 2015)

Table 2-2 Summary of Theories adopted in Literature

2.3.3 Theoretical approach of the current research

It is now well established that workplace stress has detrimental effects on employees' health including various somatic and psychological illnesses while at the same time causes severe negative socioeconomic consequences including reduced productivity, decreased job performance, higher rates of absenteeism and turnover intention, presenteeism, burnout and employee compensation claims (Wolever *et al.*, 2012; Van Gordon *et al.*, 2014; Shonin and Van Gordon, 2015). Indirect costs to organizations and industries arising from these consequences are estimated between 70 to 100 billion pounds in the UK while in the US the respective costs exceed 300 billion dollars per year. In 2014, only in the UK workplace stress accounted for 35%

of all health related ill health cases (Health and Safety Executive, 2014) while in the US one of the top leading sources of stress is reported to be the workplace (American Psychological Society, 2013). As a result, it becomes evident that workplace stress results in huge monetary and psychological costs affecting adversely both employees and organizations.

Various stress management interventions have been proposed in the literature as methods to alleviate stress within occupational settings. Recently, mindfulness has been proposed as a mechanism that can effectively alleviate stress and improve employee well-being (MAPPG, 2015). More specifically, recently there has been a surge of interest as well as empirical evidence demonstrating the effectiveness of mindfulness in decreasing workplace stress. Previous studies have revealed that mindfulness can effectively reduce stress within occupational settings (Klatt, Buckworth and Malarkey, 2009; Wolever *et al.*, 2012; Van Gordon *et al.*, 2014; Grégoire and Lachance, 2015; Shapiro, Wang and Peltason, 2015; Shonin and Van Gordon, 2015). Furthermore, a number of authors have recently suggested that mindfulness may affect positively employee well-being, which is associated with a number of work related aspects such as productivity, performance, turnover intention and absenteeism (Dane, 2011; Glomb *et al.*, 2011; Dane and Brummel, 2013; Schultz *et al.*, 2015; Good *et al.*, 2016).

A major source of stress within occupational settings is technology, as employees are obliged to utilize several different ICT applications in order to complete their work tasks. Technostress is described as the negative impact arising from ICT usage within the work environment and manifests in 'emotional and physical stress associated with technology and the introduction of new technologies' (Meischke *et al.*, 2015, p. 29). New information and digital technologies have changed organizational settings as well as the workload of employees thus contributing to higher levels of stress. ICT-enabled interruptions, such as emails and instant messages, contribute to technostress conditions at work, severely affecting individual productivity thus leading to a decrease in organizational productivity. Recent evidence suggests that employees need four minutes in order to reorient themselves and get back to their task after an email interruption while most of employees fail to return to their original task (Galluch, Grover and Thatcher, 2015). However, recent

academic research claims that mindfulness can offer considerable benefits both to individuals and organizations and can effectively combat work related stress (MAPPG, 2015). Extant research has recommended that future studies should investigate the relationships between mindfulness, technology usage, interruptions and health consequences within occupational settings (Allen and Kiburz, 2012). In addition, in their study investigating sources, symptoms and buffers of stress in emergency call centers, Meischke *et al.*, (2015), after considering technostress as one of many sources of stress, posit that mindfulness may alleviate the harmful effects of stress within occupational settings. Moreover, recently in their theoretical paper Maier *et al.*, (2017) suggest that the investigation of personality traits' influences, such as IT mindfulness, on technostress is imperative. To our knowledge, these constitute the only studies till today that consider the constructs of mindfulness and technostress together. As a result, the need for additional studies emerges that will explore the role of mindfulness as a potential buffer to stress induced by ICT usage. For this reason, the present study suggests mindfulness as a method to mitigate the impact of technostress stressors, alleviate the adverse effects arising from extended ICT usage within organizational settings and ultimately contribute to employee well-being.

This study draws from the transactional model of stress and adopts mindfulness as a theoretical lens in order to investigate the phenomenon of technostress. As previously mentioned, the main elements of the transaction model of stress are stressors, situational factors and strain outcomes. By incorporating mindfulness into the transaction model of stress, the current study considers stress as transaction between a person and the surrounding environment and suggests mindfulness as a situational factor or technostress inhibitor that can mitigate the impact of stressors and also counteract the negative consequences arising from technostress.

Previous technostress studies have used theoretical approaches that encompass some limitations. Previous studies investigating methods to combat technostress have adopted social cognitive theory suggesting that the enhancement of an individual's self-efficacy may reduce perceived technostress (Shu, Tu and Wang, 2011) and contribute to employees sales performance (Tarafdar, Pullins and Ragu-Nathan,

2015) within occupational settings. However, empirical evidence is still very scarce. Moreover, the improvement of self-efficacy in the context of alleviating the negative impact of technostress offers limited benefits to individuals. As previously mentioned, self-efficacy is the belief or judgement of an individual about his own capabilities to perform a task or behaviour. Customized training can enhance an individual's self-efficacy by improving his confidence, motivation as well as belief building. On the other hand, mindfulness is described as a process of awareness in the present moment, paying attention to both internal (thoughts and feelings) and external stimuli (physical and social environment), having the ability to think out of habitual and automatic patterns and accepting current situations as they are rather than striving to change them (Glomb *et al.*, 2011; Reb and Atkins, 2015). Mindfulness encompasses non-judgmental attention, acceptance, openness and curiosity to occurring situations (Reb and Atkins, 2015). As a result, it becomes apparent that by comparing the two previously mentioned concepts although both self-efficacy and mindfulness can be enhanced through training programs that can be embedded in organizational settings, mindfulness goes beyond self-efficacy and can potentially offer a wider variety of 'mechanisms' that an individual could deploy in his endeavour to combat technostress. As a result, the exploration of mindfulness as a mechanism to alleviate technostress and its negative consequences is deemed as crucial for the improvement of employees' well-being within workplace settings.

2.4 Mindfulness

2.4.1 Introduction

In recent years, mindfulness has gained a tremendous amount of popularity. According to the Mindfulness All-Party Parliamentary Group (MAPPG, 2015) report released by the UK government, more than five hundred scientific journal papers are being published every year on the mindfulness concept. Scientific research on mindfulness has been thriving across various fields such as Medicine, Clinical

Psychology, Healthcare, Business, Organizational Science and Education (Williams and Kabat-Zinn, 2011; Good *et al.*, 2016). Mindfulness as a concept was initially introduced in psychology and the health sector as an attempt to discover alternative practices to alleviate medical and psychological health issues. Research findings indicate that mindfulness practices offer myriad of benefits to individuals such as lower levels of depression (Foley *et al.*, 2010) and anxiety (Biegel *et al.*, 2009), relief from pain (Carmody and Baer, 2008), enhanced well-being (Chiesa and Serretti, 2010), improved working memory (Chambers, Lo and Allen, 2008) and increased emotional intelligence (Brown, Ryan and Creswell, 2007).

2.4.2 Mindfulness Definitions

Mindfulness is described as a dynamic, rich state of awareness and observation of the present moment without reactivity or judgment (Glomb *et al.*, 2011). In more detail, mindfulness is described as the 'process of paying attention to what is happening in the present moment, both internal and external stimuli, and observing them without evaluation or assigning any meaning to them' (Glomb *et al.*, 2011). It incorporates the idea of 'being in the present moment' rather than focusing on past experiences and future plans (Langer 1989; Langer & Moldoveanu, 2000). In contrast, mindlessness, the logical opposite of mindfulness, refers to a state of reduced attention accompanied by firm reliance and routine use of old categories, standard operation procedures, rigid decisions and inflexible thought processes (Langer, 1992; Butler and Gray, 2006; Braun and Martz, 2007).

Several definitions have been proposed in the literature in an attempt to describe the concept of mindfulness (Chiesa, 2013) as by academic consensus it is a difficult concept to define and operationalize (Glomb *et al.*, 2011). Scientific research has adapted several different perspectives on mindfulness and depicted it as: a state, a dispositional trait, an attitude, a cognitive process, a type of meditation and an intervention program (Vago and Silbersweig, 2012; Choi and Leroy, 2015; Reb, Narayanan and Ho, 2015).

One stream of academia understands the concept of mindfulness as a notion rooted in Buddhist philosophy that shares ideas with several contemplative traditions where the focus is on cultivating attention and awareness (Brown and Ryan, 2003; Brown, Ryan and Creswell, 2007). By incorporating elements of this classical notion of mindfulness, contemporary research psychology introduced mindfulness into Western health care. According to Brown, Ryan and Creswell (2007, p. 212), mindfulness is 'a receptive attention and awareness of present moment events and experience'. Bishop *et al.* (2004) developed a consensus operationalization of mindfulness and argued that it consists of two components namely (a) self-regulation of attention and (b) orientation in experience. Self-regulation of attention involves sustained attention and attention switching and the inhibition of elaborative processing. At first, sustained attention refers to the ability of an individual to maintain awareness of the current experience. Attention switching refers to the ability to switch focus from one object to another and thus have flexibility in attention. By paying attention only to internal stimuli such as thoughts, feelings and sensations, an individual achieves the inhibition of elaborative processing and experiences directly every event in the mind and body (Bishop *et al.*, 2004). Orientation in experience describes the quality of an individual who approaches each occurring experience with acceptance, curiosity and openness (Bishop *et al.*, 2004). Also, it involves a process of self-observation along with a decentering perspective of thoughts, emotions and experiences (Bishop *et al.*, 2004). Grounded on the landmark definition of one of the central founders of mindfulness Kabat-Zinn, (1994), Shapiro (2009) defined the concept as 'the awareness that arises through intentionally attending in an open, accepting, and discerning way to whatever is arising in the present moment' (Shapiro, 2009, p. 556). In their seminal work, that was the first research to describe the primary underlying mechanisms of mindfulness, Shapiro *et al.* (2006) posit that intention, attention and attitude constitute the main building blocks of the concept. As a result, it becomes apparent that although several researchers have attempted to provide a definition of mindfulness, the majority of them agree that awareness and attention are at the heart of mindfulness constituting the central building blocks of this concept.

Another important stream of research, that follows an information processing point of view, supports a definition of mindfulness, initially proposed by the ground-breaking work of Langer (1989), describing it as an active information processing mode. According to Langer (1989), the construct of mindfulness at the individual level contains the components of: (a) openness to novelty (b) alertness to distinction (c) sensitivity to different contexts (d) implicit, if not explicit, awareness of multiple perspectives and (e) orientation in the present (Langer, 1989; Sternberg, 2000; Butler and Gray, 2006). Openness to novelty refers to the mindful individual who is characterized by curiosity in exploring new ideas and engaging in novel stimuli (Roberts, Thatcher and Klein, 2007a). Alertness to distinction refers to the mindful individual who develops novel ideas and ways of looking at things and constantly creates new categories rather than relying on old ones (Roberts, Thatcher and Klein, 2007a). Sensitivity to different contexts refers to the ability of the individual to have a complete awareness of the characteristics of a situation in order to notice potential changes (Matook and Kautz, 2008). Awareness of multiple perspectives refers to the ability of an individual to perceive and analyse a situation from diverse and opposing perspectives (Roberts, Thatcher and Klein, 2007a). At last, orientation in the present refers to the extent that an individual devotes his attention to the immediate situation and actual surroundings (Matook and Kautz, 2008). Langer's definition of mindfulness shares similarities with the aforementioned presented stream of research, agreeing that mindfulness encompasses present moment orientation including awareness and active deployment of attention. However, it is differentiated in the fact that it has no religious underpinnings and encompasses a 'process of drawing novel distinctions' (Ellen J. Langer and Moldoveanu, 2000, p. 1) interpreting the world by constantly creating new categories to understand phenomena. Rather than observing without judgement, Langer's definition includes intentionally searching for novelty and distinctions as well as creation of new categories. Moreover, it emphasizes on how the individual perceives his behavior and his environment while the aforementioned definitions describe mindfulness as paying attention both to internal and external stimuli (Brown and Ryan, 2003; Brown, Ryan and Creswell, 2007; Glomb *et al.*, 2011). Although Langer's definition of mindfulness has some conceptual differences with the aforementioned stream of

research, evidence suggests that the two forms of mindfulness are very related, more on the present moment orientation dimension and less in the novelty seeking, but further research is considered as essential (Brown, Ryan and Creswell, 2007).

A large body of literature has attempted to propose several different operational definitions of mindfulness describing it as a one dimensional (Brown and Ryan, 2003; Walach *et al.*, 2006; Kumar, Feldman and Hayes, 2008), two dimensional (Bishop *et al.*, 2004; Cardaciotto *et al.*, 2008) or as a multi-dimensional construct (Langer, 1989; Baer *et al.*, 2006). Despite the considerable amount of research published on the concept of mindfulness, previous studies have failed to develop an unequivocal operational definition of mindfulness (Chiesa, 2013; Van Gordon *et al.*, 2014; Reb and Atkins, 2015). However, Reb and Atkins (2015) argue that the existing diversity of perspectives on mindfulness, as depicted by extant literature, is more than reasonable as mindfulness is a living concept with a profound nomological network extending across several disciplines and applications while Singh *et al.* (2008, p. 661) also highlight that 'the definition of mindfulness will vary depending on whether one is interested in mindfulness from a social psychological, clinical, or spiritual context, or from the perspective of a researcher, clinician, or a practitioner, and their various combination'.

Dane (2011) provides a comprehensive summary of several definitions established in the literature on the concept of mindfulness on the individual level (Figure 3). As depicted in Figure 3, a number of similarities can be noted among these definitions of mindfulness. As already mentioned, attention and awareness of the present moment constitute the main common features of the different definitions of mindfulness.

Definitions of Mindfulness

Source	Domain	Definition of Mindfulness
Brown, Ryan, and Creswell (2007, p. 212)	Academia	"A receptive attention to and awareness of present moment events and experience."
M. Epstein (1995, p. 96)	Academia	"Bare attention in which moment-to-moment awareness of changing objects of perception is cultivated."
Hanh (1976, p. 11)	Buddhism	"Keeping one's consciousness alive to the present reality."
Harvey (2000, p. 38)	Academia	"A state of keen awareness of mental and physical phenomena as they arise within and around [oneself]."
Herndon (2008, p. 32)	Academia	"Being attentively present to what is happening in the here and now."
Kabat-Zinn (2005, p. 4)	Academia and medical practice	"Paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally."
Lau et al. (2006, p. 1447)	Academia	"A mode, or state-like quality, that is maintained only when attention to experience is intentionally cultivated with an open, nonjudgmental orientation to experience."
Nyanaponika (1972, p. 5)	Buddhism	"The clear and single-minded awareness of what actually happens to us and in us at the successive moments of perception."
Rosch (2007, p. 259)	Academia	"A simple mental factor that can be present or absent in a moment of consciousness. It means to adhere, in that moment, to the object of consciousness with a clear mental focus."
Thondup (1996, p. 48)	Buddhism and academia	"Giving full attention to the present, without worries about the past or future."
Weick and Sutcliffe (2006, p. 518)	Academia	"Eastern mindfulness means having the ability to hang on to current objects, to remember them, and not to lose sight of them through distraction, wandering attention, associative thinking, explaining away, or rejection."

Figure 2-2 Definitions of mindfulness source: (Dane, 2011)

It becomes evident from Figure 2 that several authors characterize mindfulness as a state of consciousness. Academic literature, especially in the psychology domain, has proposed a classification of mindfulness that divides it into dispositional and state mindfulness (Mesmer-Magnus *et al.*, 2017). Dispositional or trait mindfulness refers to mindfulness as an inherent human capacity, a stable individual difference, a personality trait similar to other personality characteristics (Glomb *et al.*, 2011). According to Kabat-Zinn (2003), we are all mindful to a certain degree at one moment or another. Brown, Ryan and Creswell, (2007) argue that mindfulness 'is considered an inherent capacity of the human organism' as it is also called everyday mindfulness (Thompson and Waltz, 2007). Repeated mindfulness inductions can increase one's own dispositional (trait) levels of mindfulness over a long period of time (Chiesa, 2013). On the other hand, state mindfulness can be described as a mode-like quality that can be achieved and cultivated through meditation or other similar training techniques and is not a quality that some people possess or lack (Dane, 2011; Mesmer-Magnus *et al.*, 2017). Mindfulness as a state is maintained

when attention to experience is intentionally cultivated (Chiesa, 2013). Chiesa (2013) argue that the existence of this latter classification of mindfulness into trait or state mindfulness does not mean that the two qualities are mutually exclusive.

Based on the work of Langer (1989), who describes the attributes of a mindful individual, some decades later Weick and Sutcliffe (2001) extended the concept of mindfulness from individuals to organizations by presenting the idea of collective or organizational mindfulness for high reliability organizations (HRO's). According to Weick and Sutcliffe (2001, p. 42), organizational mindfulness is:

> a combination of ongoing scrutiny of existing expectations, continuous refinement and differentiation of expectations based on newer experiences, willingness and capability to invent new expectations that make sense of unprecedented events

Collective mindfulness consists of five key processes: (a) preoccupation with failure (b) reluctance to simplify interpretations, (c) attention to operations, (d) focus on resilience, and (e) the migration of decisions to expertise (Weick, Sutcliffe and Obstfeld, 2008). Mindful organizations, engaged in preoccupation with failure, are concerned more about failure than success. By encouraging as well as rewarding error reporting, the organization utilizes its errors and failures in order to improve and learn more about its system (Weick, Sutcliffe and Obstfeld, 2008). A mindful organization, implementing reluctance to simplify interpretations, considers simplifications as potentially dangerous (Weick, Sutcliffe and Obstfeld, 2008) and strives to appreciate the complexity of each occurring event by avoiding relying on routine heuristics (Khan, Lederer and Mirchandani, 2013). It adopts a collective desire to look at problems from several different, novel and conflicting perspectives (Butler and Gray, 2006). As a result, the organization is able to detect all potential discrepancies and react timely and appropriately (Khan, Lederer and Mirchandani, 2013). Sensitivity to operations refers to the individual's capability of having in mind an integrated overall picture of the organization's operations at the moment as well as situational awareness that can be used in order to prevent potential catastrophic failures (Weick, Sutcliffe and Obstfeld, 2008). Commitment to resilience in a mindful organization involves the ability to absorb change, bounce

back and recover from errors as well as cope with surprises in the moment that they occur (Weick, Sutcliffe and Obstfeld, 2008). Deference to expertise refers to the mindful organization who loosens the hierarchical formal structure during a crisis so that authority and decision making migrate to individuals and units that possess the required expertise to solve the problem at hand (Weick, Sutcliffe and Obstfeld, 2008).

2.4.3 Mindfulness Benefits

In recent years, a remarkable surge of interest has been expressed on the empirical investigation of mindfulness and its applications. Today, there is a large volume of published studies empirically supporting the efficacy of mindfulness based interventions and their impact on individuals (Baer *et al.*, 2006) mostly in the healthcare sector (Gotink *et al.*, 2015) but also in the organizational and business sector (Hyland, Lee and Mills, 2015). The majority of extant academic research has focused on investigating the potential clinical benefits of mindfulness practices in physical and mental health of an individual as well as in his psychological conditions (Baer *et al.*, 2006; Brown, Ryan and Creswell, 2007; Hanson and Richardson, 2014; Good *et al.*, 2016). More specifically, studies have established the linkage of mindfulness to reduction in pain and decrease in medical symptoms of patients (Brown, Ryan and Creswell, 2007; Carmody and Baer, 2008; Glomb *et al.*, 2011; Hyland, Lee and Mills, 2015) as well to reduction in blood pressure and alcohol and substance abuse (Chiesa and Serretti, 2010). Evidence supports that mindfulness can alleviate both mental and physical symptoms of patients suffering from chronic pain, cancer, cardiovascular disease and mental disorders (Gotink *et al.*, 2015). Furthermore, there is a large and growing body of research empirically validating the association of mindfulness with stress reduction, decreased levels of anxiety and improvements in depressive symptoms both in clinical and non-clinical populations (Brown, Ryan and Creswell, 2007; Chiesa and Serretti, 2010; Hanson and Richardson, 2014; Sharma and Rush, 2014; Gotink *et al.*, 2015; Hyland, Lee and Mills, 2015; Good *et al.*, 2016). Moreover, previous studies have affirmed the positive effects of mindfulness in the increase of an individual's wellbeing (Brown,

Ryan and Creswell, 2007; Hanson and Richardson, 2014; Sharma and Rush, 2014; Good *et al.*, 2016), improvement of the quality of life (Brown, Ryan and Creswell, 2007; Hanson and Richardson, 2014; Gotink *et al.*, 2015), increase in positive emotions (Hanson and Richardson, 2014) and reduction in negative affect (Hanson and Richardson, 2014; Sharma and Rush, 2014; Good *et al.*, 2016). In addition, it has been demonstrated that mindfulness can reduce emotional exhaustion (Sharma and Rush, 2014; Hyland, Lee and Mills, 2015), enhance self-compassion (Sharma and Rush, 2014; Hyland, Lee and Mills, 2015) and improve emotional intelligence (Brown, Ryan and Creswell, 2007). Except for the psychological and physical benefits that mindfulness can provide to individuals, previous studies have identified a link between mindfulness and brain activity (Chiesa and Serretti, 2010; Hyland, Lee and Mills, 2015; Good *et al.*, 2016). More specifically, evidence has shown that mindfulness is associated with improved working memory (Hanson and Richardson, 2014), increased attention and focus as well as enhanced sensory processing and executive functioning (Hyland, Lee and Mills, 2015). Overall, the most repeatedly evidenced and most commonly cited benefit of mindfulness is stress reduction in individuals, inside and outside of organizational settings (Sharma and Rush, 2014; Hyland, Lee and Mills, 2015).

2.4.4 Mindfulness interventions

Despite the existence of several different operationalizations of mindfulness, extant scientific research has agreed that mindfulness either as a trait or a state can be developed through training (Sauer *et al.*, 2013). Mindfulness can be cultivated through various practices and techniques that are called Mindfulness Based Interventions (MBI). Designed in a secular format, free from any cultural, religious, and ideological factors associated with the Buddhist tradition, mindfulness interventions serve as a platform to learn, engage and cultivate mindfulness (Kabat-Zinn, 2003) and thus realize its potential positive influences. Among the most prominent ones is the Mindfulness Based Stress Reduction program (MSBR), that was developed by molecular biologist Jon Kabat-Zinn in the early 1980's, and was initially designed to assist hospital patients. The MSBR is an 8-week duration

training program that includes one meeting per week as well as daily exercises of mindfulness at home (Hyland, Lee and Mills, 2015). Since the original invention of the program, more than 20,000 people have participated in it at the University of Massachusetts (Hyland, Lee and Mills, 2015). Inspired by the development and success of MSBR, several additional mindfulness programs have emerged such as the Mindfulness Based Cognitive Therapy (MBCT) (Glomb *et al.*, 2011; Hyland, Lee and Mills, 2015), the Dialectical Behavior Therapy (DBT), the Acceptance and Commitment Therapy(ACT) as well as more variations of them (Baer *et al.*, 2006; Brown, Ryan and Creswell, 2007; Bergomi, Tschacher and Kupper, 2013; Chiesa, 2013; Sauer *et al.*, 2013; Hyland, Lee and Mills, 2015).

2.4.5 Measurement methods of mindfulness

As already mentioned in the previous sections, extant academic literature has defined mindfulness in several different conceptualizations failing to provide one equivocal operational definition. As a result, the assessment of the construct through one universal, valid and reliable instrument has not been yet achieved (Baer *et al.*, 2006; Bergomi, Tschacher and Kupper, 2013). A number of assessment methods of mindfulness have been proposed in the literature depending on the operationalization of the concept into a one facet construct or a multi-facet construct (Chiesa, 2013; Sauer *et al.*, 2013). Every available assessment instrument presents an attempt to conceptualize the essence of mindfulness (Baer *et al.*, 2006). As a result, current scales differ on the fundamental aspects that constitute mindfulness (Bergomi, Tschacher and Kupper, 2013). Over the last decade, a substantial number of mindfulness questionnaires have been presented in academic literature and have been utilized in empirical investigations (Bergomi, Tschacher and Kupper, 2013). One of the most widely employed instruments to assess mindfulness is the Mindfulness Attention and Awareness scale (MAAS) developed by Brown and Ryan (2003). The MAAS is a psychometric scale with 15 items that conceives mindfulness as a one dimensional construct including as main feature attention at present moment (Chiesa, 2013; Sauer *et al.*, 2013). A number of studies have developed instruments conceptualizing mindfulness as a one facet construct. Among them, the Freiburg

Mindfulness Inventory (FMI) is a 30-item instrument, built on the premises of Buddhism and designed for use by expert meditators (Walach *et al.*, 2006). Moreover, the Cognitive and Affective Mindfulness Scale (CAMS) is a 12-item questionnaire that captures a general experience of mindfulness (Feldman *et al.*, 2007) while the Southampton Mindfulness Questionnaire (SMQ) is a 16-item self-report questionnaire measuring mindfulness with respect to distressing thoughts and images (Baer *et al.*, 2006). In contrast to aforementioned assessment methods, another stream of research claims that mindfulness should be conceptualized into a multi facet construct in order to take into account the complexity of the original definition of mindfulness (Chiesa, 2013). According to this assertion, the Kentucky Inventory of Mindfulness Skills (KIMS) was designed as a 39-item instrument to measure mindfulness in daily life comprising of four elements namely observing, describing, acting with awareness and accepting without judgement (Baer, 2004). In an attempt to integrate all five previously mentioned questionnaires and conceptualizations of mindfulness and by drawing items mostly from KIMS, the Five Factors Mindfulness Questionnaire (FFMQ) is a 39-item instrument that includes five aspects of mindfulness: non-reactivity, observing, acting with awareness, describing and non-judging (Baer *et al.*, 2006). Also, the Philadelphia Mindfulness Scale (PHMS), based on the definitions of Kabat-Zinn (2003) and Brown and Ryan (2003), is a 20-item questionnaire that includes two components of mindfulness namely awareness and acceptance (Cardaciotto *et al.*, 2008) while the Mindfulness/Mindlessness Scale (MMS) was designed as a 21-item trait measure assessing the factors that were developed by Langer(1989). At last, the Toronto Mindfulness Scale (TMS), which measures two aspects of mindfulness as decentering and curiosity (Lau *et al.*, 2006), is the only currently developed instrument that assesses mindfulness as a state and not as a trait in contrast to all previously mentioned instruments (Bergomi, Tschacher and Kupper, 2013; Sauer *et al.*, 2013).

Overall, existing scales differ in several dimensions regarding the targeted audience, such as clinical or non-clinical, novice or experienced individual as well as how mindfulness is scored and whether is considered as a trait or as state (Choi and Leroy, 2015). It has been argued that a major issue in the current assessment

methods of mindfulness is the fact that each instrument encompasses a different conceptualization of the concept presenting it either as a one dimensional construct or as a multi-dimensional construct with several different facets (Bergomi, Tschacher and Kupper (2013). Also, an important challenge is the fact that the majority of the existing assessment methods are self-report measures that may not constitute a valid assessment of mindfulness (Bergomi, Tschacher and Kupper, 2013). Nevertheless, several studies have supported the validity of self-report measures for the assessment of mindfulness while evidence on the existence of bias that may affect the self-report assessment of mindfulness is still scarce and inconsistent. According to extant research, in order to overcome the limitation of using only a scale instrument to measure mindfulness, researchers recommend the use of mixed methods approaches incorporating qualitative investigations (Bergomi, Tschacher and Kupper, 2013; Sauer et al., 2013) complementing surveys in order to capture a more comprehensive understanding of mindfulness (Choi and Leroy, 2015). As a result, it is crucial that a normative and equivocal definition of mindfulness is established in order to provide a solid theoretical and methodological foundation for the assessment of the construct (Bergomi, Tschacher and Kupper, 2013).

2.4.6 Mindfulness in organizations

A large body of academic research has been published on the concept mindfulness across numerous disciplines. The majority of studies focus on the investigation of its salutary effects within clinical settings in order to address health issues and improve individuals' well-being (Reb and Atkins, 2015). However, recently scientific research has expanded into the Management and Organization disciplines by investigating the potential benefits of mindfulness and its applications within the workplace setting (Reb, Narayanan and Ho, 2015; Good *et al.*, 2016). At first, mindfulness research was extended to the workplace context as an attempt to alleviate stress working conditions and improve employees' well-being, while recently there has been a surge of interest in investigating the impact of mindfulness

on numerous work related aspects that would ultimately enhance employee performance and organizational success.

Besides the academic surge of interest, mindfulness has also gained tremendous attention from the industry as occupational stakeholders seem to be interested in the applications of mindfulness in the workplace settings that can concurrently improve work related health issues and job performance of the employees of the organization (Shonin, Gordon and Griffiths, 2014; Van Gordon *et al.*, 2014). Large technology enterprises like Google, Facebook, Twitter and Intel as well as companies from other industries such as Transport for London (TFL) (Chaskalson and Hadley, 2015) and Aetna have recognized the value and potential benefits of mindfulness practices and are offering nowadays in-house tailored mindfulness sessions to their employees as an attempt to enhance their overall well-being, ultimately aiming to raise their performance, productivity, innovation and creativity (Hyland, Lee and Mills, 2015; Reb and Atkins, 2015; Wang, 2015).

A growing body of research has been focusing on investigating the role of mindfulness in stress working conditions. Previous studies have empirically demonstrated that mindfulness can substantially reduce work related stress (Klatt, Buckworth and Malarkey, 2009; Wolever *et al.*, 2012; Roeser *et al.*, 2013), alleviate psychological distress as well as reduce anxiety and depression (Grégoire and Lachance, 2015; Virgili, 2015; Lomas *et al.*, 2017) while it can improve work life balance (Allen and Kiburz, 2012; Allen and Paddock, 2015) and alleviate burnout within the workplace (Charoensukmongkol, 2013; Taylor and Millear, 2016). Focusing on work related stress, previous studies have empirically shown that mindfulness, either as a dispositional trait or as a meditation intervention, can effectively reduce psychological distress of working individuals (Grégoire and Lachance, 2015; Virgili, 2015; Grover *et al.*, 2016; Zimmaro *et al.*, 2016; Lomas *et al.*, 2017; Mesmer-Magnus *et al.*, 2017). Evidence has shown that there is a direct negative association between mindfulness and workplace stress thus revealing that by being more mindful in the workplace settings, individuals can effectively reduce experiences of stress.

Current research posits that mindfulness can be beneficial for organizations on a number of levels, by positively affecting numerous work related aspects with the end result being increased employee performance (Hanson and Richardson, 2014). A wealth of evidence has shown that mindfulness affects positively human functioning and more specifically it can improve the information processing speed capability of an individual (Moore and Malinowski, 2009) as well as increase sustained attention (Chambers, Lo and Allen, 2008), improve executive functioning (Zeidan *et al.*, 2010) and decrease mind wandering (Allen and Paddock, 2015). Furthermore, a number of previous studies have repeatedly confirmed that mindfulness can increase working memory capacity (Zeidan *et al.*, 2010; Hyland, Lee and Mills, 2015) while other studies have shown that mindfulness can improve performance in cognitive tasks (Zeidan *et al.*, 2010).

Most of the extant literature posits that mindfulness may have a positive influence on individual performance within the workplace but evidence till today remains scarce (Glomb *et al.*, 2011; Hanson and Richardson, 2014; Good *et al.*, 2016). To investigate this issue, Dane (2011) articulated a contingency theoretical framework suggesting that by fostering wide attentional breadth, mindfulness can positively affect task performance within a dynamic environment. Previous studies have shown that mindfulness can improve the job performance of restaurant workers (Dane and Brummel, 2013) as well as the academic performance of female MBA students (Shao and Skarlicki, 2009). Also, in their study Reb, Narayanan and Chaturvedi (2014) have supported that supervisors' mindfulness positively affects employee performance while Shonin *et al.*, (2014) demonstrated that mindfulness training can improve employer rated job performance. More recently, King and Haar, (2017) empirically revealed that mindfulness is positively related to leadership performance. Although some research has been carried out on the effects of mindfulness on performance, to date there has been very little empirical evidence on the relationship of the two constructs (Leroy *et al.*, 2013). As a result, it becomes apparent that more empirical research is needed in order to establish a valid connection of mindfulness to performance within work settings.

Although a large number of studies have suggested that mindfulness is likely to positively affect several work related outcomes such as creativity, innovation,

resilience at work, work engagement, productivity, absenteeism and turnover (Hyland, Lee and Mills, 2015), there is a notably surprising paucity of empirical investigations. Amongst the few existing studies, Levy *et al.* (2012) demonstrated that mindfulness can positively affect aspects of multitasking behavior while others have revealed that mindfulness can improve job satisfaction (Hülsheger *et al.*, 2012; Charoensukmongkol, 2013; Shonin *et al.*, 2014) enhance work engagement (Leroy *et al.*, 2013) and reduce turnover intention (Dane and Brummel, 2013).

By delineating the theoretical mechanisms by which mindfulness may affirmatively influence organizational settings, a number of previous studies have proposed that mindfulness can improve human judgment and decision making (Karelaia and Reb, 2015), enhance innovation and creativity (Kudesia, 2015; Reb and Atkins, 2015) as well as improve negotiation effectiveness (Kong, 2015) improve leadership skills (Reb *et al.*, 2015; Good *et al.*, 2016) and enhance teamwork (Good *et al.*, 2016). Furthermore, previous research has suggested that by increasing an individual's resilience, mindfulness can improve coping mechanisms and facilitate faster recovery from negative events (Shapiro, Wang and Peltason, 2015) as well as foster the prioritization of important tasks by inhibiting automatic habitual reactions (Shapiro, Wang and Peltason, 2015), Moreover, it has been argued that the reduction of automaticity resulting from mindfulness as well as the increased response flexibility can contribute to a more productive environment and lead to greater satisfaction in employees within their work settings (Glomb *et al.*, 2011; Hyland, Lee and Mills, 2015; Reb and Atkins, 2015; Shapiro, Wang and Peltason, 2015; Good *et al.*, 2016). Also, it has been suggested that via the increase of an individual's empathy, emotional intelligence and compassion, mindfulness can improve the interpersonal communication and relationships between employees of an organization and thus create a more positive working environment (Glomb *et al.*, 2011; Hanson and Richardson, 2014; Shapiro, Wang and Peltason, 2015; Good *et al.*, 2016).

As depicted above, a considerable body of research suggests that by positively influencing several work related aspects and processes, mindfulness may indirectly impact employee performance and well-being. Glomb *et al.*, (2011) provide a comprehensive summary of the potential benefits of mindfulness into workplace

settings by describing the secondary processes through which mindfulness can improve the well-being and performance of an individual (Figure 2-3). Overall, extant literature on the concept of mindfulness in the work setting presents several limitations. At first, the majority of current mindfulness research within the workplace is comprised from theoretical evaluations of its applications in the improvement of personal care and well-being and more importantly on the enhancement of the professional effectiveness of an individual. Although preliminary findings may support the connection of mindfulness to few work related constructs, empirical evidence is still very scarce (Glomb *et al.*, 2011; Dane and Brummel, 2013; Reb, Narayanan and Ho, 2015). Further research, considering various types of work settings as well as populations, is deemed as crucial in order to achieve generalizability of potential results (Glomb *et al.*, 2011). According to Reb and Atkins, (2015) academic research on workplace mindfulness is still in its infancy.

Mindfulness-Based Process	Possible Work-Related Effects
Response flexibility	• Improved decision making • Improved communication
Decreased rumination	• Improved coping with stressful events • Faster recovery from negative events • Increased confidence and self-efficacy • Better problem solving • Improved concentrations • More effective use of social support
Empathy	• Increased interactional and informational justice • Reduced antisocial behavior • Increased organizational citizenship behaviors • Positive leadership behaviors
Affective regulation	• Improved communication • Improved coping with stressful events • Faster recovery from negative events • Fewer accidents
Increased self-determination and persistence	• Increased goal-directed effort • Improved task performance • Greater learning • Increased job satisfaction • Increased organizational commitment • Increased performance on creative tasks
Increased working memory	• Reduced negative affect • Improved ability to handle multiple demands • Ability to perform under stress
More accurate affective forecasting	• Less biased decision making • More accurate expectations • Less frustration and negative emotion

Figure 2-3 Potential effects of mindfulness on employee performance and well-being, source: (Glomb et al., 2011)

2.4.7 Mindfulness in the IS domain

In the Information Systems (IS) domain, mindfulness was firstly introduced through the work of Swanson and Ramiller (2004) proposing the idea of incorporating mindfulness into the processes of comprehension, implementation, adoption and assimilation of an IT innovation in an organization. Grounded on the work of Weick and Sutcliffe (2001) who analysed the concept of mindfulness at the organizational level in High Reliability Organizations (HRO), Swanson and Ramiller's study (2004) serves as the baseline research on the mindfulness concept in the IS domain. Later on, in their landmark paper Butler and Gray (2006) argued that by adopting a mindfulness perspective organizations can achieve reliable performance of

Information Systems. Henceforth, several research studies followed mostly on the organizational or collective level (Elbanna & Murray, 2009; Carlo, Lyytinen, Boland, & Fitzgerald, 2012; Vogus & Sutcliffe, 2012) whereas research on the individual level remains limited till today (Goswami, Teo and Chan, 2009; Sun and Fang, 2010; Wolf, Pinter and Beck, 2011).

Mindfulness in the IS domain has been used as a theoretical lens in order to investigate various kinds of phenomena. During the last decade, a considerable amount of literature has grown up around the theme of collective or organizational mindfulness (OM). Drawing from Langer's (1989) initial definition of individual mindfulness, Weick, Sutcliffe and Obstfeld (1999) extended this concept into the group/organizational level and more specifically in the context of High Reliability Organizations (HROs). In their seminal article, Weick, Sutcliffe and Obstfeld (1999) claim that although HRO's operate in a highly complex and risky environment and are characterized by intolerability to trial-error learning, they manage effectively to detect errors, deal with unexpected events and successfully achieve high reliability functioning due to their mindful infrastructure that consists of five cognitive processes: (1) preoccupation with failure, (2) reluctance to simplify interpretations, (3) sensitivity to operations, (4) commitment to resilience and (5) under specification of structures/deference to expertise (Weick, Sutcliffe and Obstfeld, 2008). Several studies followed this taxonomy by adopting the organizational mindfulness perspective and conducted investigations mostly around the themes of IT innovation, agility and reliability of Information Technology (IT) Table 2-3 presents the themes in existing studies investigating mindfulness in the IS domain.

Level of Mindfulness	Theme	Reference
Organizational	IT innovation adoption	(Swanson and Ramiller, 2004; Ramiller and Swanson, 2009; Teo *et al.*, 2011; De Hertogh and Viaene, 2012; Lee, Sun and Wang, 2012; Wolf, Beck and Pahlke, 2012; Leung, Cheung and Chu, 2014; Mu, Kirsch and Butler, 2015; Oredo and Njihia, 2015; Aanestad and Jensen, 2016)
	Agility and Agile Software Development	(Matook and Kautz, 2008; Elbanna and Murray, 2009; Vidgen and Wang, 2009; Nagle, McAvoy and Sammon, 2011; Mcavoy, Nagle and Sammon, 2013; Cram and Newell, 2016)
	Organizational Reliability	Butler and Gray, (2006); Carlo, Lyytinen and Boland, (2012)
	Impact of Information Technology on mindfulness	Valorinta, (2009)
	Impact on: business continuity, IS performance, job performance, ERP system usage	(Braun and Martz, 2007; Khan, Lederer and Mirchandani, 2013; Dernbecher, Risius and Beck, 2014; Nwankpa and Roumani, 2014)
Individual	Measurement of mindfulness	(Thatcher *et al.*, forthcoming; Roberts, Thatcher and Klein, 2007a)
	Impact on IT use and outcomes: performance, information overload, IT dissatisfaction, IT security	(Wolf, Pinter and Beck, 2011; Nevo and Nevo, 2012; Bernárdez *et al.*, 2014, 2018; Jensen *et al.*, 2017)
	Decision making	Goswami et al. (2009)
	Technology acceptance, Technology adoption	(Sun and Fang, 2010; Stefi, 2015; Zou, Sun and Fang, 2015; Sun *et al.*, 2016)
	IS design	Wang, (2015)
	IT mindfulness	(Carter *et al.*, 2011; Maier *et al.*, 2017)

Table 2-3 Themes on mindfulness in IS Literature

A considerable amount of literature has adopted mindfulness as a theory in the investigation of IT innovation adoption in organizations. More specifically, previous studies have investigated the concept of mindfulness in the adoption of new technology systems in small firms (Lee, Sun and Wang, 2012), in the adoption of Cloud Computing (Oredo and Njihia, 2015), in radio frequency identification technology (RFID) (Teo *et al.*, 2011; Leung, Cheung and Chu, 2014) and ERP implementations (Mu, Kirsch and Butler, 2015) as well as in IT assimilation in highly turbulent environments (Wolf, Beck and Pahlke, 2012). More recently, studies have investigated how collective mindfulness is achieved during the post-implementation adaptation phase of a healthcare IS system (Aanestad and Jensen, 2016). Moreover, previous research has proposed that the implementation of mindfulness routines in an organization can foster collective mindfulness across the various phases of IT innovation (Ramiller and Swanson, 2009) while others have suggested that decision making during IT innovation adoption can be supported by a mindful consideration of managerial challenges (De Hertogh and Viaene, 2012).

A number of studies have explored the relationship of mindfulness with several IT related phenomena. More specifically, studies have investigated the impact of mindfulness on the business continuity planning preparedness of an organization (Braun and Martz 2007), on Information Systems (IS) performance through top management support (Khan, Lederer and Mirchandani, 2013) as well as on ERP usage (Nwankpa and Roumani, 2014) and on job performance in a mobile work environment (Dernbecher, 2014). Moreover, the impact of Information Technology on collective mindfulness in organizations has been examined (Valorinta, 2009) while others combined mindfulness with dialectics in order to examine organizational reliability and IT capabilities (Carlo, Lyytinen and Boland 2012). Furthermore, a group of published studies have used mindfulness as a theoretical lens in order to investigate Agile Software Development (ASD) (Matook and Kautz, 2008; Elbanna and Murray, 2009; Vidgen and Wang, 2009; Nagle, McAvoy and Sammon, 2011; Mcavoy, Nagle and Sammon, 2013; Cram and Newell, 2016).

Although there is a large volume of studies investigating mindfulness at the collective level, there is relatively a small body of academic literature concerned with individual mindfulness within the IS domain. Following an information

processing point of view, these studies utilize the notion of mindfulness and the dimensions originally proposed by Langer (1989).

Roberts (2007) performed the first empirical study in the field by developing a domain specific instrument for the assessment of individual mindfulness while Goswami, Teo and Chan (2009) identified the determinants of decision maker mindfulness in IT innovation adoption. Theoretical research studies have suggested that mindfulness influences IT dissatisfaction and re-invention (Nevo and Nevo, 2012) and have proposed the embedment of mindfulness in IS design in education (Wang, 2015). By examining the effects of individual mindfulness in technology acceptance, studies have shown that mindfulness can directly affect users' intention to use technology (Sun and Fang, 2010) as well developers' intention to re-use software (Stefi, 2015). Regarding the effects of individual mindfulness, empirical findings have revealed that it can effectively mitigate the negative consequences arising from information overload (Wolf, Pinter and Beck, 2011), increase students' performance in conceptual modelling ((Bernárdez *et al.*, 2014, 2018) and also alleviate post adoption regret arising from herd behaviour (Zou, Sun and Fang, 2015). Moreover, it has been shown that mindful adoption can increase perceived usefulness thus increasing task-technology fit at the post adoption stage leading to high satisfaction and continuance to use the technology (Sun *et al.*, 2016). Also, in the context of IT security it has been empirically revealed that mindfulness, in the form of a training, can substantially decrease individuals' susceptibility to phishing attacks (Jensen *et al.*, 2017).

In their seminal papers, both Swanson and Ramiller, (2004) and Butler and Gray, (2006) provided some theoretical foundations as well as research directions for future work to be carried on the concept of mindfulness within the IS domain including subjects such as: IT innovation, IS design, IS operations, business continuity, agility, management of IS, top management support, organizational processes and individual mindfulness. As presented in Table 2-3, it becomes apparent that indeed the majority of extant academic research has followed the recommended research directions conducted investigations in the proposed subjects.

Regarding the type of studies that constitute extant mindfulness literature in IS, although few theoretical evaluations have been published, the majority of current research consists of empirical investigations conducting mostly surveys, few interviews and observations. Experimental studies are only a few, mostly carried out in student contexts, evaluating the effects of mindfulness practices on individual effectiveness and performance (Bernárdez *et al.*, 2014, 2018). Most of the participants participated in empirical studies were students, top executive employees or developers (Table 2-4).

Population	Reference
Students, academics	(Roberts, Thatcher and Klein, 2007a; Constantiou, Madsen and Papazafeiropoulou, 2011; Bernárdez *et al.*, 2014, 2018; Wang, 2015; Zou, Sun and Fang, 2015; Sun *et al.*, 2016; Jensen *et al.*, 2017)
CEOs, Senior executives	(Goswami, Teo and Chan, 2009; Wolf, Beck and Pahlke, 2012; Khan, Lederer and Mirchandani, 2013)
Software company employees	(Vidgen and Wang, 2009; Nagle, McAvoy and Sammon, 2011; Mcavoy, Nagle and Sammon, 2013; Stefi, 2015)
Financial services employees	(Elbanna and Murray, 2009; Wolf, Pinter and Beck, 2011)
Various types of private and public sector companies	(Matook and Kautz, 2008; Valorinta, 2009; Sun and Fang, 2010; De Hertogh and Viaene, 2012; Lee, Sun and Wang, 2012; Dernbecher, Risius and Beck, 2014; Nwankpa and Roumani, 2014; Mu, Kirsch and Butler, 2015; Aanestad and Jensen, 2016)

Table 2-4 Focus on population sample

As already mentioned above, most of the present studies have focused on examining mindfulness at the organizational level and developed measurement instruments based on the baseline study of Weick and Sutcliffe (2001). Mu and Butler, (2009) were the first to provide a method for the assessment of mindfulness at the collective level in the IS domain while later on, Mu, Kirsch and Butler, (2015), refining their previous study, developed a comprehensive instrument to evaluate organizational

mindfulness. For the assessment of individual mindfulness, despite the wide adoption of the concept of mindfulness for over a decade by researchers in the IS domain, there is a surprising paucity of research studies focusing on adapting Langer's measure on the IT context and creating a domain specific instrument (Roberts, Thatcher and Klein, 2007a; Sun, 2011). Roberts (2007) was the first who adapted an instrument from Langer's scales to the IT context, based on the psychometric properties of mindfulness. The studies that followed on individual mindfulness, developed limited instruments by measuring mindfulness into very specific research contexts such as technology acceptance context, decision making (Goswami, Teo and Chan, 2009; Sun and Fang, 2010). Recently, in his seminal article, (Thatcher *et al.*, forthcoming) address this issue by developing a domain specific individual-level measure of mindfulness and established the concept of IT mindfulness. They define IT mindfulness as 'a dynamic IT-specific trait, evident when working with IT, whereby the user focuses on the present, pays attention to detail, exhibits a willingness to consider other uses, and expresses genuine interest in investigating IT features and failures' (Thatcher *et al.*, forthcoming, p. 5). Grounded on Langer's (1989) definition, Thatcher *et al.* (forthcoming) argue that IT mindfulness, oriented in IT use and contexts, consists of four dimensions: alertness to distinction, awareness of multiple perspectives, openness to novelty and orientation in the present. Alertness to distinction refers to the extent that a mindful individual understands the capabilities of IT applications and the context that they will prove more useful. As a result, when the individual notices discrepancies between his use and the actual potential of the system or application, he is able to generate new ways of using the system (Thatcher *et al.*, forthcoming). Awareness of multiple perspectives refers to the mindful individual who is able to identify and create multiple uses of a specific IT application as well as develop innovative solutions to problems that may arise in the working environment (Thatcher *et al.*, forthcoming; Roberts, Thatcher and Klein, 2007b). Openness to novelty refers to the willingness of an individual to explore more potential and novel applications of the deployed system as he is always curious and flexible to experiment with the features of the system. At last, orientation in the present refers to the mindful individual who is involved as well as focused on the present moment and current context and able to

adapt technologies at several different context (Roberts, Thatcher and Klein, 2007b). According to the seminal work of (Thatcher et al., forthcoming), IT mindfulness constitutes a distinct concept than mindfulness; although the two concepts share the present moment orientation and awareness in the behaviour of an individual, they are different in their focus. Mindfulness refers to one's propensity to exhibit mindfulness broadly, across various situations and times, during several contexts of everyday life whether at work or at home. On the other hand, IT mindfulness is an IT specific trait, describing the behaviour of an individual in specific situations and contexts. IT mindfulness is evident only when one is working with technology and oriented in the IT context. As a result, one person can be generally mindful but not necessarily demonstrate high levels of IT mindfulness. In their study, (Thatcher et al., forthcoming) empirically revealed that IT mindfulness discriminates with mindfulness exhibiting more influence on IT related outcomes in post adoption system use.

The concept of IT mindfulness has received research attention from very few theoretical research studies till today, aiming to investigate the impact of IT mindfulness on individual's propensity to innovate with technology (Carter *et al.*, 2011), as well as the influence of personality traits, including IT mindfulness, on technology induced stress (Maier *et al.*, 2017). As a result, it becomes apparent that further research is deemed as crucial empirically investigating the concept of IT mindfulness, as existing academic research on the concept is still in its infancy.

2.5 Summary

The literature review chapter provided a comprehensive overview of existing research and studies on the investigated concepts of the current study, namely technostress and mindfulness incorporating studies from several disciplines such as Business and Organization studies adding to IS literature. At first, the focus of the chapter is in gaining a better understanding on the causes as well as on the impact of technostress on work related outcomes while also present existing mitigating factors that can alleviate its negative consequences. Next, the chapter provided an in depth

examination of the concept of mindfulness. By delineating the several different operational definitions of mindfulness, stressing the fact that there has been no agreement on an unequivocal definition, the current chapter aimed to provide a thorough understanding on the concept of mindfulness along with its benefits, in and outside of organizational settings. The currently available measurement methods of mindfulness are described as well as interventions that have been designed and widely deployed in order to enhance mindfulness. Focusing on existing studies that have investigated mindfulness within organizational settings, the current chapter describes the role of mindfulness in enhancing individual outcomes, including work related and health related outcomes as well as in reducing stress creating conditions. At last, the current chapter presents a thorough overview of the investigation of mindfulness within the IS domain, introducing the concept of IT mindfulness while also critically evaluating existing research and discussing limitations and gaps in current scientific knowledge in IS field.

Chapter 3: Theoretical Basis & Conceptual Framework

3.1 Introduction

The literature review chapter discussed thoroughly the concepts of technostress and mindfulness as well as the theoretical models that previous studies in the IS field have deployed. Also, it presented the necessary justification for the selection of the theoretical approach that the current thesis will follow. Drawing from the previous chapter, the current chapter will discuss the development of the proposed conceptual framework of the current study by analysing the different factors that comprise it as well as by providing the necessary theoretical foundation that supports the arguments and thus the hypotheses of the current proposed model. A detailed analysis and justification for the selection of each of the variables will be presented as well as justification of the proposed relationships between the independent and outcome variables that constitute the proposed conceptual model.

3.2 Proposed Theoretical Framework

The proposed theoretical model of the current study, presented in Figure 3.1, is based on the transaction-based model of stress and examines mindfulness as a situational variable or else called technostress inhibitor that can reduce the effects of technostress on individuals within organizational settings (Tarafdar *et al.*, 2007). As a result, mindfulness is expected to be negatively associated with technostress creators. According to the transaction-based model of stress(Cooper, Dewe and O'Driscoll, 2001), individuals experience strain as a result of technostress.

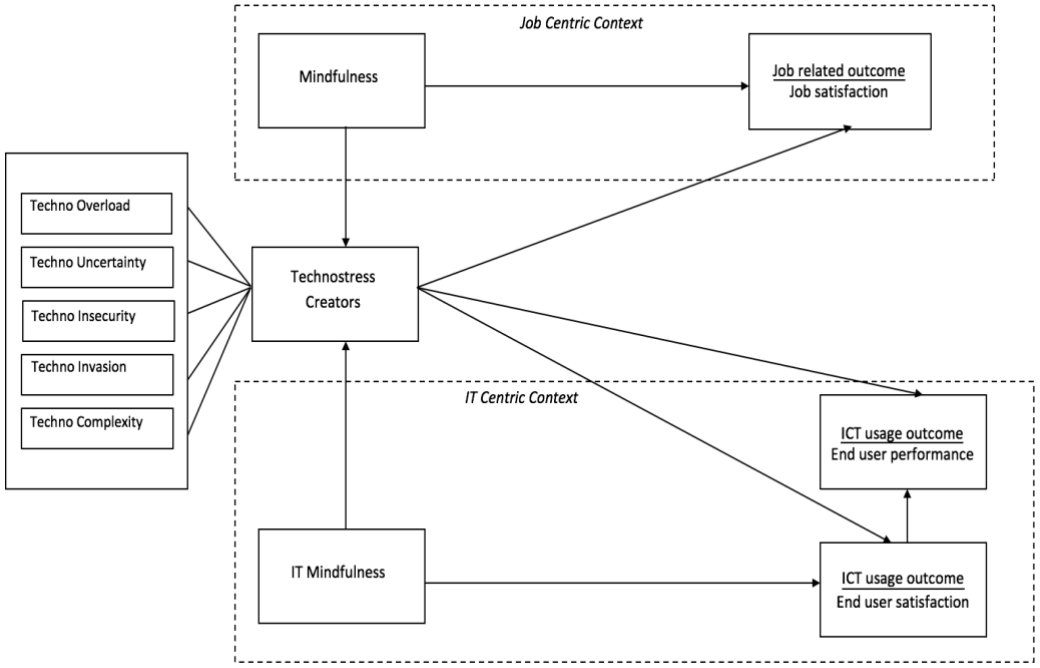

Figure 3-1 Depiction of proposed theoretical framework with relationships among mindfulness, technostress creators, job related and end user computing outcomes

Strain can manifest in either a behavioural form such as poor productivity, poor performance, turnover intention or in psychological outcomes such as job dissatisfaction and depression (Tarafdar, Tu and Ragu-Nathan, 2010). The majority of studies have been focusing on the investigation of the impact of technostress on behavioural and psychological outcomes. However, recent academic literature has proposed a third category of strain, that has been neglected by previous studies, introducing the perspective of end user computing. More specifically, it has been posited that technostress can lead to ICT strain by decreasing users' satisfaction with the ICT applications they are using as well by reducing individuals' task performance (Tarafdar, Tu and Ragu-Nathan, 2010). The current model is divided into two contexts: the job-centric context and the IT-centric context. From the IT-centric context by encompassing the end user perspective, the current proposed theoretical framework highlights the need to evaluate the impact of technostress as well as the effectiveness of potential inhibitors on end user computing outcomes. As

a result, the present framework examines that mindfulness is expected to be positively related with end user satisfaction (Sun, 2011) and indirectly associated with end user performance (Tarafdar, Tu and Ragu-Nathan, 2010). Also, technostress creators are expected to negatively influence end user satisfaction and end user performance (Tarafdar, Tu and Ragu-Nathan, 2010). From the job-centric perspective, the proposed model incorporates job satisfaction as a job related outcome and aims to empirically investigate its relationship with technostress and mindfulness. As a result, it is expected that mindfulness will positively influence job satisfaction while technostress is expected to have a negative impact on this job related outcome. Table 3-1 presents a summary of the proposed hypotheses of the current study derived from the proposed theoretical framework.

Hypotheses
H1: Technostress creators negatively influence job satisfaction
H2: Technostress creators negatively influence end user satisfaction
H3: Technostress creators negatively influence end user performance
H4: End user satisfaction positively influences end user performance
H5: Mindfulness is positively related to job satisfaction
H6: Mindfulness negatively influences technostress creators
H7: IT Mindfulness is positively related to end user satisfaction
H8: IT Mindfulness negatively influences technostress creators

Table 3-1 Summary of proposed hypotheses

3.3 Independent Variables

The independent variables of the proposed model constitute in technostress, mindfulness and IT mindfulness all of which were introduced and thoroughly discussed in the previous chapter. In this section, we will review again the main

concepts of these variables. Table 3-2 presents the definitions adopted from existing literature for the independent variables and main constructs of this study.

The first independent variable of the proposed conceptual model, technostress, has been defined as the 'stress caused by an inability to cope with the demands of organisational computer usage' (Tarafdar, Tu and Ragu-Nathan, 2010, p. 304). Extensive dependence and use of technologies within organizational settings have created a stressful working environment for employees who are constantly forced to adapt, learn and move along with new applications, functionalities and business processes. The factors that create technostress within organizational context or else called technostress creators are comprised of: techno overload including multitasking and information overload, techno invasion referring to feelings of constant connectivity, techno insecurity referring to the fear of losing one's job due to emerging technologies, techno uncertainty referring to frequent upgrades and rapid advances of ICTs and at last techno complexity describing continuous relearning efforts of individuals towards new and updated applications.

Mindfulness is the second independent variable of the proposed model. Mindfulness can be defined as 'the awareness that arises through intentionally attending in an open, accepting, and discerning way to whatever is arising in the present moment' (Shapiro, 2009, p. 556). Previous studies have proposed several definitions of this construct but an unequivocal definition has not been established yet. However, there has been academic consensus that the main elements of mindfulness constitute in receptive attention to present events and experiences along with present-oriented awareness and focus on immediate experiences rather than thinking about the past or the future (Bishop *et al.*, 2004). In the current study, we adopt one of the most popular and well recognized definitions in the field of mindfulness, characterized as the landmark definition, established by Dr Kabat Zinn, one of the central founders of the field of mindfulness (Black, 2011; Van Gordon *et al.*, 2014). This definition of the concept states that mindfulness is described as 'paying attention in a particular way: on purpose, in the present moment, and non-judgementally'(Kabat-Zinn, 1994, p. 4).

At last, the third independent variable of the proposed model is IT mindfulness. As previously described, IT mindfulness refers to 'a dynamic IT-specific trait, evident when working with IT, whereby the user focuses on the present, pays attention to detail, exhibits a willingness to consider other uses, and expresses genuine interest in investigating IT features and failures' (Thatcher *et al.*, forthcoming, p. 5). Grounded on Langer's seminal work, IT mindfulness comprises of: alertness to distinction, openness to novelty, awareness of multiple perspectives and orientation in the present. While mindfulness can be existent in any context, IT mindfulness is present only in IT related contexts.

Concept	Definition	Reference
Technostress	'stress caused by an inability to cope with the demands of organisational computer usage'	(Tarafdar, Tu and Ragu-Nathan, 2010)
Mindfulness	'paying attention in a particular way: on purpose, in the present moment, and non-judgementally'.	(Kabat-Zinn, 1994)
IT mindfulness	'a dynamic IT-specific trait, evident when working with IT, whereby the user focuses on the present, pays attention to detail, exhibits a willingness to consider other uses, and expresses genuine interest in investigating IT features and failures'	(J. Thatcher *et al.*, forthcoming)

Table 3-2 Definitions of the main constructs of this study adopted from existing literature

3.4 Outcome Variables

3.4.1 Job Satisfaction

Job Satisfaction has been defined as 'a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences' (Locke 1976, p. 1300) describing 'a match between what individuals perceive they need and what rewards

they perceive they receive from their jobs' (Conrad, Conrad and Parker, 1985, p. 163). In other words, job satisfaction reflects all the feelings that an individual expresses towards his job. There is an extensive body of literature recognizing the importance of investigating job satisfaction across various disciplines such as organizational behaviour, organizational psychology, business and marketing research (Khan *et al.*, 2012). Job satisfaction can affect the productivity of an individual as well his performance, motivation, organizational commitment and rates of absenteeism (Khan *et al.*, 2012). It significantly increases the retention of employees in an organization as well as reduces the costs of hiring new staff. Widely studied in the stress and technostress literature, job satisfaction can severely affect employee functioning and thus create substantial costs for organizations (Ragu-Nathan *et al.*, 2008). For all these reasons, the selection of job satisfaction as an outcome variable in the proposed theoretical model was deemed as very important.

3.4.2 End User Satisfaction

Over the last few decades, there has been a surge of interest in the construct of user satisfaction (Simmers and Anandarajan, 2001; Bokhari, 2005). According to Ives (1983, p.785), who provided one of the first definitions of the construct, user satisfaction is considered as the 'the extent to which users believe the information system available to them meets their information requirements'. It encompasses the idea of 'an individual's emotional state following IT usage experience' (Bhattacherjee and Premkumar, 2004, p. 237) and describes the 'positive attitude and perception of an individual towards the ICT that he or she uses in the course of performing day-to-day work processes' (Tarafdar, Tu and Ragu-Nathan, 2010, p. 311).

User satisfaction has been widely used, both by researchers and the industry, as a tool in order to measure the successful interaction of an individual with the currently deployed information system and more importantly as a critical determinant of a system's success (Delone and Mclean, 2003). Over the last decades, IS success has received considerable critical attention as its evaluation can provide valuable

information to organizations, vital to assess IS value and efficacy of the IS investment (Etezadi-Amoli and Farhoomand, 1996; Delone and Mclean, 2003). As organizations are investing millions of dollars in information technology, they are primarily concerned with the impact of IT on individual productivity, performance as well as organizational profitability. In the endeavour to assess these critical issues, user satisfaction has been widely used as a surrogate for a system's effectiveness and overall success (Doll and Torkzadeh, 1989; Paulemelone, 1990; DeLone and McLean, 1992; Tarafdar, Tu and Ragu-Nathan, 2010; Hou, 2012). Previous studies have argued that higher levels of user satisfaction with an IS can result in increased intention to use (Delone and Mclean, 2003) while a dissatisfied user will eventually stop using the system, leading to erosion of IS budgets and decreased productivity (Briggs, 2008). Furthermore, it has been posited that user satisfaction has a strong positive association with individual performance as well organizational productivity (Igbaria and Tan, 1997; Delone and Mclean, 2003) while others have proposed that user satisfaction may have a positive impact on task innovation (Torkzadeh and Doll, 1999). Recently, empirical evidence has shown that higher levels of user satisfaction lead to improved individual performance and enhanced decision making through increased system usage (Hou, 2012). Overall, existing research recognizes the critical role played by the construct as it is considered as one of the strongest predictors of organizational benefits derived from ICT usage (Bhattacherjee, 2001; Delone and Mclean, 2003). All in all, from the above arguments it can be deemed that end user satisfaction is a very important variable as it can have serious implications both for organizations and individuals thus is considered as one of the main outcomes included in the proposed theoretical model of the present study.

3.4.3 End user performance

The advent of ICTs in today's businesses has significantly changed the working environment. Managers are interested in the impact of Information Technology on employees in order to evaluate and realize the business benefits accruing from IT usage and the IS investment. In the last few decades, there has been a surge of

interest, both from researchers and practitioners, in evaluating the impact of information technology on individual's performance within work settings (Hou, 2012). Individual performance measures can encompass decision making quality, productivity, job performance and problem identification speed. In the context of the present study, end user performance is defined as 'the degree to which individuals use ICT to enhance their work performance and outcomes … [as well as] the extent to which ICT use contributes positively to their ICT mediated tasks' (Tarafdar, Tu and Ragu-Nathan, 2010, p. 311). By utilizing ICTs in order to complete their work tasks, individuals can realize numerous benefits and thus significantly improve their work performance through improved decision making quality and increased productivity as well as enhanced task efficiency and task innovation (Tarafdar, Tu and Ragu-Nathan, 2010; Hou, 2012; Ninaus *et al.*, 2015). By assessing end user performance, stakeholders can evaluate the business benefits accruing from the ICTs deployed by the organization in order to understand their business value and critically assess their investments. From all the above arguments, it can be deemed that end user performance is a critical variable both for organizations and individuals thus it has been included as an outcome in the proposed theoretical model of the present project.

3.5 Technostress creators Relationships

As already mentioned above, technostress is defined as the inability of an individual to cope with current demands of ICTs as well as to adapt to these requirements within organizational settings. Individuals experience stress due to the use of ICTs within organizational settings which comes as a result of application multitasking, constant connectivity, information overload as well as from frequent hardware and software upgrades and rapid advances of ICTs that eventually lead to job related insecurities and rising uncertainty. These feelings of stress are called stressors and more specifically technostress creators.

Previous research has empirically shown that technostress can significantly decrease an individual's job satisfaction (Ragu-Nathan *et al.*, 2008; Khan and Rehman, 2013; Kumar *et al.*, 2013; Fieseler *et al.*, 2014; Jena, 2015). Technostress creators affect negatively job satisfaction in several different ways: Current ICTs have radically changed the conventional workday as well as work hours and employees can be reached anytime and anywhere through emails, texts and mobile applications. As a result, due to this constant connectivity of ICTs, individuals feel always connected and their space and time are being continuously invaded by technology (techno invasion) thus affecting severely their sense of job satisfaction (Ragu-Nathan et al., 2008). Moreover, mobile devices along with collaborative applications have imposed a new working environment where employees are required to work faster and longer by utilizing simultaneously several sources of information in order to complete their work tasks (techno overload) (Tarafdar et al., 2011). In their endeavour to cope with information overload, multitasking and interruptions, employees experience tension, stress, inability to concentrate and dissatisfaction within organizational settings (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2011). In addition, due to techno complexity, employees need to spend more time and effort to update their skills and technical knowledge in order to keep up with the constantly evolving ICTs and understand their new capabilities (Chandra, Srivastava and Shirish, 2015). Very often, new applications and software packages can take several months for employees to learn thus creating intimidating feelings as well as stress and dissatisfaction at work (Tarafdar *et al.*, 2011). Likewise, the continuous changes and upgrades of ICTs within organizations force individuals to constantly re-learn new technologies and not be able to develop a base of experience with a particular system. Thus, employees feel that their skills are becoming rapidly obsolete thus experiencing anxiety, frustration and dissatisfaction with their job (techno uncertainty) (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2011; Chandra, Srivastava and Shirish, 2015). At last, due to techno insecurity, existing employees are threatened that they might lose their job to people that are more technologically equipped, understand better ICTs and are more inclined to using new technologies. By experiencing tension and stress and eventually developing a negative attitude towards their job, individuals feel dissatisfied with their work environment (Ragu-

Nathan *et al.*, 2008; Tarafdar *et al.*, 2011). Based on the above arguments, the following hypothesis is framed:

Hypothesis 1: Technostress creators negatively influence job satisfaction

According to the seminal study of Tarafdar, Tu and Ragu-Nathan (2010), technostress decreases end user satisfaction as each one of the five stress creating conditions has a negative impact on an individual's satisfaction with the deployed ICT at hand. In a similar vein with job satisfaction, user satisfaction is negatively affected by technostress creators. More specifically, techno overload imposes an enormous amount of receiving information to employees which is greater than the load they can efficiently handle and use thus they need to spend more time and effort to process this information. Due to this information overload, individuals feel dissatisfied with the content and output of the ICTs they are using at work. By disturbing the boundaries between home and workplace, techno invasion creates an unsettling environment to employees as they feel that they are never free of technology and are constantly under supervision. Perceiving that their personal life is being invaded by ICTs, individuals sense a loss of their privacy which results in dissatisfaction with the applications they are using. Moreover, the constant changes and updates of organizational ICTs make employees feel insecure and afraid that they will lose their job in case they are unable to adapt to new learning requirements. As a result, a negative attitude is created towards the ICT they are using for their work tasks (techno insecurity). Adding to that, techno complexity creates situations where an individual feels intimidated and incompetent in his endeavour to learn new applications resulting to become dissatisfied with ICTs due to crashes, errors and even loss of data. Likewise, due to techno uncertainty and the continuous updates and upgrades of organizational ICTs, employees, forced to constantly refresh and re-learn new applications and technologies, feel that their knowledge is rapidly becoming obsolete resulting to frustration and anxiety with the deployed ICT. Overall, based on the above arguments the second hypothesis is framed as:

Hypothesis 2: Technostress creators negatively influence end user satisfaction

In their landmark paper, Tarafdar, Tu and Ragu-Nathan (2010) have empirically demonstrated that technostress creators have a negative impact on end user performance. Moreover, recent studies have conclusively shown that technostress can significantly undermine an employee's performance while utilizing ICTs for work tasks (Chen and Muthitacharoen, 2016). For example, techno overload leads to increased multitasking with several ICTs at the same time which affects significantly the effectiveness of an individual within work settings. By severely impairing the concentration and attention of an individual, excessive multitasking along with interruptions decrease his ability to filter useful information as well as significantly increase the cognitive load, time and effort while also reduce the speed that an individual needs in order to complete organizational tasks (Tarafdar, Tu and Ragu-Nathan, 2010; Levy *et al.*, 2012). In addition, due to techno invasion and the constant connectivity of ICTs, employees are accessible anytime and anywhere thus receiving numerous interruptions that some of them may be not related to work tasks. As a result, these distractions impair the performance of an individual (Tarafdar, Tu and Ragu-Nathan, 2010; Tarafdar, Pullins and Ragu-Nathan, 2015). Moreover, techno complexity along with techno uncertainty force individuals to constantly update their skills required to understand and use organizational ICTs. By deploying their already existing knowledge in order to use new ICTs and applications, employees, who resist or are unwilling to learn new technologies, encounter numerous errors and problems with the system, experience frustration thus leading to reduced performance (Tarafdar, Tu and Ragu-Nathan, 2010). Adding to that, due to techno complexity individuals need to spend more time and effort in order to understand new ICTs which leaves little time to devote to more productive and creative work tasks. Hence, end user performance is considerably decreased (Tarafdar, Pullins and Ragu-Nathan, 2015). Likewise, techno insecurity makes individuals feel threatened about losing their job to other people that have a better understanding of new and emergent technologies, thus experiencing stress, anxiety, low self-confidence and low performance in their tasks (Tarafdar, Tu and Ragu-

Nathan, 2010; Tarafdar, Pullins and Ragu-Nathan, 2015). Based on the above arguments the third hypothesis can be framed as:

Hypothesis 3: Technostress creators negatively influence end user performance

3.6 Relationship between end user satisfaction and end user performance

In recent years, there has been a surge of interest in the IS literature regarding the relationship between end user satisfaction and end user performance. This relationship has attracted conflicting interpretations regarding the direction of effect between the constructs, whether satisfaction affects performance or the relationship is reciprocal (Etezadi-Amoli and Farhoomand, 1996). However, recent previous studies have conclusively shown that user satisfaction has a strong positive effect on individual performance in terms of productivity and task innovation (Hsu, Lai and Weng, 2008) as well as demonstrated that increased user satisfaction with business intelligence systems can positively affect the individual performance of an employee (Hou, 2012). Furthermore, it has been empirically validated that end user satisfaction positively influences end user performance within organizational settings (Tarafdar, Tu and Ragu-Nathan, 2010). More specifically, individuals that are satisfied with the ICTs they are using at work, manage to process information more effectively thus improving the quality of their work. In addition, employees satisfied with the deployed ICTs have more free time and are more willing to explore additional functions of an application or a technology as well as search for more efficient ways to execute work processes thus becoming more creative and innovative (Tarafdar, Tu and Ragu-Nathan, 2010). In other words, end user satisfaction improves end user performance in terms of productivity and innovation. Based on the above arguments the fourth hypothesis can be framed as:

Hypothesis 4: End user satisfaction positively influences end user performance

3.7 Mindfulness relationships

Over the last decade, there has been a surge of interest on the investigation of mindfulness, its salutary effects and applications within several domains such as Medicine, Psychology, Organizational Science, Business and Information Systems. The majority of the published body of literature on the concept of mindfulness has been focusing on investigating the benefits it can offer to address mainly health and psychological issues in clinical populations. Recently, the focus of attention has turned to the exploration of its potential applications in Organizational Science and more specifically in its potential beneficial effects in work related settings. Although previous studies have suggested that mindfulness may increase employee performance, improve work engagement and productivity as well as enhance creativity and innovation of an individual, still evidence is scare as there is a notable paucity of empirical research exploring its relationship with work related outcomes.

3.7.1 Relationships among mindfulness, job satisfaction and technostress

Despite the fact that there is very little published research on the investigation of the relationship of mindfulness with job satisfaction, evidence has shown that the two constructs are positively related (Hülsheger *et al.*, 2012; C. Andrews, Michele Kacmar and Kacmar, 2014; Shonin *et al.*, 2014; Reb, Narayanan and Ho, 2015). According to Glomb *et al.* (2011), mindfulness encompasses the element of decentering which means that an individual is able to distance himself from stressful events and experiences that can occur at work as well as from stressful thoughts and emotions. Through this process, a mindful individual is more likely to be aware of his environment, observe stressful situations and events more objectively, perceive

these events as well as the stressors as less negative or threatening and thus express less negative and more positive reactions (Schultz *et al.*, 2015; Good *et al.*, 2016). Hence, the individual evaluates his job in a more positive way leading to increased job satisfaction (Hülsheger *et al.*, 2012). Furthermore, mindfulness fosters the reduction of habitual and automatic use of mental processes which makes an individual able to recognize his basic values and needs. By acting in congruence with these values, a mindful individual adopts a self-determined behaviour, meaning that he is highly committed to his goals and strives to accomplish them hence experiencing greater job satisfaction (Glomb *et al.*, 2011; Hülsheger *et al.*, 2012). Based on the above arguments, the fifth hypothesis can be framed as:

Hypothesis 5: Mindfulness is positively related to job satisfaction.

Having received tremendous attention both from researchers and practitioners, mindfulness has been proposed as a method that could be utilized in order to improve individuals' well-being at work and more importantly to alleviate the huge amounts of stress that individuals experience every day within organizational settings. According to extant literature, mindfulness fosters more effective stress processing (Weinstein, Brown and Ryan, 2009); More specifically, recent evidence has confirmed that mindfulness can directly reduce work stress (Grover *et al.*, 2016). A mindful individual can cope more effectively with stressful situations by choosing less avoidant strategies and more adaptive ways of coping (Weinstein, Brown and Ryan, 2009); Better stress processing is facilitated through several underlying mechanisms of mindfulness. At first, mindfulness promotes increased awareness of the occurring stressors as well as stressful events enabling an individual to halt habitual patterns of ineffective responding, take a step back and react more objectively (Shapiro *et al.*, 2006; Alberts and Hülsheger, 2015; Malinowski and Lim, 2015). In addition, through decreased use of automaticity of mental processes and rumination, 'room is created for reflection, planning, and problem solving in the presence of current demands and challenges' (Hülsheger *et al.*, 2012, p. 116). As a result, individuals are able to consciously shape their thoughts achieving greater

cognitive flexibility which allows for a greater range of responses to occurring stimuli (Glomb *et al.*, 2011; Good *et al.*, 2016). Instead of being absorbed by and react to stressful thoughts, a mindful individual is consciously aware of what is happening in the present moment, focuses his attention intentionally to his thoughts and emotions at that moment hence chooses healthier and more adaptive ways to respond to stressful situations (Roeser *et al.*, 2013; Alberts and Hülsheger, 2015). As Shapiro *et al.*, (2006, p. 380) note 'through consciously (intention) bringing awareness (attention) and acceptance (attitude) to experience in the present moment, … [individuals] will be better able to use a wider, more adaptive range of coping skills' in order to deal with stressful situations. As a result, in the context of the present study mindfulness is expected to be positively related to technostress stressors that arise at work while employees utilize ICTs for their work tasks.

Mindfulness can decrease the impact of each one of the five technostress creators. Due to techno overload, employees have to deal with rapid task switching and incoming interruptions from numerous applications as well as with an enormous load of information derived from several different sources such as laptops, mobile phones and collaborative software. Information overload, multitasking and interruptions create a stressful and demanding working environment for individuals who strive to accomplish their work tasks timely and effortlessly. Previous studies have shown that mindfulness can mitigate the negative consequences arising from information overload (Wolf, Pinter and Beck, 2011) and multitasking (Levy *et al.*, 2012). By promoting sustained attention, the ability of an individual to focus on task-relevant information and omit any other 'disturbing' information that may arise, mindfulness can decrease information overload. Adding to that, through attention switching, enhanced self-awareness and low emotional reactivity a mindful individual can efficiently deal with interruptions and multitasking (Levy *et al.*, 2012). Since by definition mindfulness is the exact antithesis of multitasking, by noticing the occurring interruptions in the present moment and recognising that he has been pulled away by them, a mindful individual is able to adapt to shifting environments by deciding consciously to return to his tasks after these disruptions as well as to re-engage and focus on his work task at hand without anger, self-criticism or negative

feelings (Alberts and Hülsheger, 2015; Zivnuska *et al.*, 2016). In a similar way, mindfulness can decrease the impact of techno invasion, the feeling of an individual of constant connectivity to ICTs. By being attentive and focused on his present experiences as well as by thoughtfully considering how to react upon interruptions coming in from several ICTs, such as emails and messages outside of work settings, a mindful individual is more likely to appraise these situations as less threatening and respond more objectively thus decreasing the impact of techno invasion (Alberts and Hülsheger, 2015; Schultz *et al.*, 2015). Furthermore, mindfulness can reduce the impact of techno insecurity, situations where an employee feels threatened about losing his job either to other people more skilled than him or to new automated ICTs. Being aware of and noticing his stressful thoughts upon a demanding situation, a mindful individual can slow down his habitual mental processes and fears and avoid mind wandering into thinking about the future. By fully experiencing present situations and engaging in attentive focus on current moments, a mindful individual can combat feelings of anxiety and stress about the future that arise from job insecurity (Jacobs and Blustein, 2008; Glomb *et al.*, 2011). Similarly, mindfulness can decrease the impact of techno uncertainty and techno complexity, referring to situations where the complexity as well as constant upgrades of organizational ICTs create unsettling feelings to individuals. Mindfulness promotes decreased rumination and automatic negative thinking as well increased self-determination for the pursuing and accomplishment of one's goals (Glomb *et al.*, 2011; Hülsheger *et al.*, 2012; Roeser *et al.*, 2013). Through these processes, a mindful individual feels more confident about his already acquired skills and knowledge as well as becomes more interested in enhancing his learning efforts towards combatting his unsettling feelings caused both by techno complexity and techno uncertainty (Glomb *et al.*, 2011). Based on the above arguments the following hypothesis can be framed:

Hypothesis 6: Mindfulness negatively influences technostress creators

3.8 IT Mindfulness relationships

In the IS domain, there is a considerable amount of literature employing mindfulness as a theoretical lens in order to investigate its impact on several IT related phenomena such as IT innovation adoption, technology acceptance, business continuity and IS performance. Despite the wide adoption of the concept of mindfulness for over a decade by researchers in this domain, there is a surprising paucity of research studies focusing on adapting mindfulness on the IT context and creating a domain specific instrument (Roberts, Thatcher and Klein, 2007a; Sun, 2011). In their seminal article, (Thatcher *et al.*, forthcoming) address this issue by developing for the first time a domain specific individual-level measure of mindfulness and introduce the notion of IT mindfulness. They define it as 'a dynamic IT-specific trait, evident when working with IT, whereby the user focuses on the present, pays attention to detail, exhibits a willingness to consider other uses, and expresses genuine interest in investigating IT features and failures.' (Thatcher *et al.*, forthcoming, p. 5). Grounded on Langer's (1989) definition, (Thatcher *et al.*, forthcoming) argue that IT mindfulness, oriented in IT use and contexts, consists of four dimensions: alertness to distinction, awareness of multiple perspectives, openness to novelty and orientation in the present. Alertness to distinction refers to the extent that a mindful individual understands the capabilities of IT applications and the context that they will prove more useful. As a result, when the individual notices discrepancies between his use and the actual potential of the system or application, he is able to generate new ways of using the system (Thatcher *et al.*, forthcoming). Awareness of multiple perspectives refers to the mindful individual who is able to identify and create multiple uses of a specific IT application as well as develop innovative solutions to problems that may arise in the working environment (Thatcher *et al.*, forthcoming; Roberts, Thatcher and Klein, 2007b). Openness to novelty refers to the willingness of an individual to explore more potential and novel applications of the deployed system as he is always curious and flexible to experiment with the features of the system. At last, orientation in the present refers to the mindful individual who is involved as well as focused on the present moment

and current context and able to adapt technologies at several different context (Roberts, Thatcher and Klein, 2007b).

3.8.1 Relationship among IT mindfulness, end user satisfaction and technostress

Similar to the relationship of mindfulness with job satisfaction in the job-centric context, in the IT-centric context we expect that IT mindfulness will be positively related to end user satisfaction. Previous studies have empirically shown that mindfulness can positively affect user satisfaction at the post adoption phase of a system (Sun, 2011) while recently it has been argued that mindfulness has a positive impact on task technology fit which leads to higher user satisfaction and intention to use the system (Sun *et al.*, 2016). According to Ellen J Langer and Moldoveanu (2000), mindfulness could be used as a tool to increase employee satisfaction within the workplace. Based on previous findings that reveal that the more a mindful individual is engaged in a subject, the more he likes it, it is suggested that this might apply within the workplace as well (Ellen J Langer and Moldoveanu, 2000). In the context of the present study, we expect that the more a mindful individual engages with the deployed technology and pursues novelty, the more satisfied he will be with the ICT he is using for his work tasks.

IT mindfulness can affect user satisfaction through several mechanisms. An IT mindful individual will respond in a more flexible and adaptive way in unexpected events occurring in his working environment thus resulting in higher end user satisfaction (Sun, 2011). Instead of responding prematurely and habitually to stimuli, reactions drawn from assumptions and expectations formed in the past, an IT mindful individual is actively engaged in the present, sensitive to every context, paying attention to every detail of the ICT application at hand (Nass and Moon, 2000; Carson and Langer, 2006). By actively noticing new aspects of an ICT application and fully comprehending its capabilities, an IT mindful individual is open, flexible and curious to experiment with the ICT at hand in order to explore

more features and potential uses that will allow him to resolve any challenging situation as well as accomplish his work tasks more effectively (Thatcher *et al.*, forthcoming). As a result, the individual perceives a higher satisfaction from the ICT he is using for his work tasks. Furthermore, by acknowledging the existence of multiple perspectives and the fact that perceived disadvantages could be advantages when viewed from another point of view, an IT mindful individual is able to vary his response and shift perspectives depending on the context, create innovative solutions to resolve occurring problems and implement 'workarounds' in order to achieve a fit between the deployed technology and the task at hand (Ellen J. Langer and Moldoveanu, 2000; Carson and Langer, 2006; Roberts, Thatcher and Klein, 2007b). As a result, he is able to complete his ICT mediated tasks successfully thus experiencing more positive feelings and less negative attitude towards the ICT in use. Furthermore, mindfulness can foster satisfaction and positive feelings towards ICTs at work by allowing the individual to break each task into parts, consider alternative perspectives to the problem and focus on its advantages rather than its disadvantages (Ellen J Langer and Moldoveanu, 2000). Based on the above arguments, we frame following hypothesis as:

Hypothesis 7: IT Mindfulness is positively related to end user satisfaction

In her seminal work, Langer (1989) argues that stressful events can be perceived as less stressful when an individual views them from multiple perspectives, by considering solutions rather than getting absorbed by negative thoughts and anxiety. As a result, mindfulness can enhance an individual's well-being and prevent burnout (Langer, 1989). Applying this notion in the IT context, we expect that IT mindfulness will decrease the impact of technostress creators. Techno overload forces employees to deal with numerous interruptions and severe multitasking with various ICT applications at the same time leading to hurried and ineffective information processing, leaving little time and less focused attention to accomplish other important tasks essential to achieve organizational goals (Tarafdar, Pullins and Ragu-Nathan, 2015). By viewing situations from multiple perspectives and allowing

deviations from a habitual way of working, a more IT mindful individual is able to adapt to shifting environments and create innovative solutions to problems that may arise within the workplace (Langer, 1989; Roberts, Thatcher and Klein, 2007b). In addition, an IT mindful user is able to consider alternative perspectives when a problem occurs, such as use the system in more creative ways than what the user was originally trained for or even uses unintended by the designer, as well as implement 'workarounds' in order to execute his work processes (Roberts, Thatcher and Klein, 2007b). As a result, the impact of techno overload is decreased. Techno invasion, referring to situations of constant and ubiquitous connectivity where individuals feel never free of technology, has created blurring boundaries between home and the workplace making employees feel that they can be reached anywhere and anytime through their mobile computing devices. Oriented and focused in the present, an IT mindful user is able to adapt his ICT applications' uses depending each time on the specific context (Thatcher *et al.*, forthcoming) According to Langer (1989), change of context renews energy as well as generates creativity and imagination. As a result, an IT mindful user is able to change the context and vary his response to incoming interruptions when he is away from work by adapting to the current environment and consciously understanding his alternative choices such as deciding to avoid using his work mobile device when he is at home (Ragu-Nathan *et al.*, 2008). By fostering sensitivity to different contexts and allowing the escape from rigid mindsets and narrow perspectives, IT mindfulness can decrease the invasive effects of ICTs into employees' lives as well as alleviate the unsettling feelings that individuals experience thus decreasing the impact of techno invasion. Techno uncertainty and techno complexity create situations where individuals feel unsettled as well as inadequate in terms of their knowledge and skills against the complexity and constant changes and upgrades of organizational ICTs. Engaged in openness to novel stimuli and new information, an IT mindful user demonstrates curiosity and willingness to experiment and explore existing features of ICT applications as well as their upcoming updates and upgrades thus decreasing the perceived complexity of the deployed ICTs (Thatcher *et al.*, forthcoming; Langer, 1989) Adding to that, IT mindfulness enhances the certainty and control that an individual feels over a situation thus overall decreasing the impact of the previously mentioned stressors

(Langer, 1989). At last, an IT mindful individual can decrease his feelings of job insecurity (techno insecurity) by considering alternate perspectives and acknowledging that the same situation or stimulus when called by a different name or interpreted differently is a different stimulus (Langer, 1989). For example, it is very common nowadays for most people to have formed the idea that emerging technologies will eventually replace people's jobs in the future. As a result, this notion may create unsettling feelings to employees under some circumstances. In this case, an IT mindful individual, instead of relying rigidly on categories formed in the past, is able to create new categories and distinctions and consciously change his interpretation by acknowledging that the situation is not life threating and he can cope and overcome this for example by adapting his skills and knowledge to new technologies. By escaping from a rigid mindset and narrow perspectives as well as from categories and distinctions formed in the past, an IT mindful individual is able to unlock his mindset and focus on the present, create new categories and interpret the challenging situation differently (Langer, 1989). Based on the previous arguments the following hypothesis can be formed:

Hypothesis 8: IT Mindfulness negatively influences technostress creators

3.9 Summary

In this chapter, we proposed a conceptual model that examines mindfulness as a mechanism that can reduce technostress conditions as well as alleviate the negative consequences arising from technostress within organizational settings. The research model is based on the transaction-based model of stress, a prominent stress model in the extant literature, and adopts a mindfulness perspective that has not been investigated before. The model aims to evaluate the effects of mindfulness on technostress on two contexts: the job-centric context with job satisfaction as an organizational job related outcome and the IT-centric context with end user satisfaction and end user performance as end user computing outcomes.

Overall, the current research study proposes and tests 8 Hypotheses aiming to explore the impact of mindfulness on technostress and on the outcome strain. The proposed conceptual framework will be empirically tested on working individuals who use technology for their daily work tasks. As a result, the next chapter discusses the methodology, research approach and design that were chosen in order to fulfil the objectives and achieve the overall aim of this research.

Chapter 4: Research Methodology and Design

4.1 Introduction

Chapter 2 provided the necessary underlying theoretical foundation of the present study, reviewing the concepts of technostress and mindfulness while in Chapter 3 we outlined the development of the conceptual theoretical framework of the current project by analysing its dependent and independent variables, showing the relationships between technostress, mindfulness and the job related and IT usage related outcomes aiming ultimately to examine the effects of mindfulness on ICT induced stress. The current chapter will discuss the philosophical paradigm and epistemological assumptions that underpin the present research study as well as justify the research methodology that was followed during the execution of the study in order to fulfil the proposed aim and objectives and answer the research question of the project.

The present study followed a mixed method approach; In the first phase of data collection, a quantitative methodology was followed that allowed the researcher to collect data through the deployment of a survey-based approach (online questionnaire) in order to validate the proposed theoretical framework. SEM using AMOS was the data analysis technique that was deployed. Furthermore, in the second phase of the present study the researcher followed a qualitative approach in order to acquire deeper insight into the relationships that were validated quantitatively. Using interviews as a data collection technique, the researcher deployed thematic analysis as a data analysis technique.

4.2 Underlying Research Assumptions

The Information Systems field has evolved over the last three decades with researchers showing an increased interest and creating a considerable debate on identifying the 'best' or most 'appropriate' set of methods and approaches for information systems research (Galliers, 1990; Mingers, 2001). The Information Systems field has been vastly characterized by extant literature as a multi-disciplinary field as Webster and Watson (2002, p.2) explicitly note 'IS is an interdisciplinary field straddling other disciplines'. Drawing from various research fields and disciplines, such as psychology, sociology, mathematics, technology and linguistics, the IS field offers a plethora of philosophical assumptions and research approaches to choose from (Mingers, 2001). Researchers have supported the existence of several philosophical approaches and methodological assumptions and agreed on the fact that there is no 'universally' applicable solution; as highlighted by Orlikowski and Baroudi (1991), the existence of a single research perspective in IS is not feasible. In their landmark paper, Orlikowski and Baroudi (1991) discuss the underlying beliefs of the conduct of research constituting in beliefs about physical and social reality, knowledge and the relationship between them (Table 4-1). Various positions on these beliefs constitute the three broad philosophical paradigms or schools of thought in Information Systems research; Positivism, Interpretivism and Critical Theory (Orlikowski and Baroudi, 1991; Klein and Myers, 1999; Chen and Hirschheim, 2004).

Beliefs	Explanation
Physical and Social Reality: Ontology Human Rationality Social Relations	 Whether social and physical worlds are objective and exist independently of humans, or subjective and exist only through human action The intentionality ascribed to human action Whether social relations are intrinsically stable and orderly, or essentially dynamic and conflictive
Knowledge: Epistemology Methodology	 Criteria for constructing and evaluating knowledge Which research methods are appropriate for generating valid evidence
The relationship between Theory and Practice:	The purpose of knowledge in practice

Table 4-1 Beliefs Underlying the Philosophical paradigms (adapted from (Orlikowski and Baroudi, 1991)

In their seminal study, Orlikowski and Baroudi (1991) argue that positivism is the most dominant paradigm in IS research while later on more recent studies have re-confirmed this fact revealing positivism's dominance as an epistemology in the IS field (Chen and Hirschheim, 2004). Rooted in logical positivism, the positivism perspective assumes that there are fixed a priori relationships within phenomena that can be distinguished from other philosophical assumptions due to the existence of 'formal propositions, quantifiable measures of variables, hypotheses testing, and the drawing of inferences about a phenomenon from the sample to a stated population.'(Orlikowski and Baroudi, 1991, p. 5). Furthermore, positivist supporters believe that the investigated phenomenon is tangible and fragmented, can be described in a unique way while also they assume that there is a unidirectional relationship between the investigated variables that can be tested through hypotheses development. Positivist researchers believe in an objective social and physical world where the understanding of a phenomenon can be achieved through the measurement of constructs by a designed instrument where the researcher's role is passive in the investigation of the phenomenon in focus (Orlikowski and Baroudi, 1991).

Interpretivism argues that our knowledge of reality cannot be understood independently of social actors but in conjunction with social constructions such as language, consciousness, meanings and other tools (Klein and Myers, 1999; Myers, 2011). In contrast with positivism, interpretive research does not specify dependent and independent variables but rather aims to understand phenomena through the meanings that people assign to them (Orlikowski and Baroudi, 1991; Klein and Myers, 1999; Myers, 2011). While positivists aim to predict phenomena, interpretivists' goal is to explain them by focusing on the subjective meaning of reality constructed through human and social interaction processes (Klein and Myers, 1999).

Critical researchers strive to critically evaluate and change the social reality by critiquing current social systems and revealing any conflicts that may exist within them. Critical theorists believe 'social reality is historically constituted and ... produced and reproduced by people'(Myers, 2011, p. 42) as that people have the power to change their material, social and economic circumstances but their efforts are constrained from cultural, social and political domination as well as from natural laws and resources (Orlikowski and Baroudi, 1991; Klein and Myers, 1999; Myers, 2011). Although similar in many ways, critical research is distinguished from interpretive research in the fact that it aims to challenge prevailing beliefs, values and assumptions while the latter one only describes existing knowledge and beliefs (Myers, 2011).

4.2.1 Justification of Positivist Research Philosophy for this study

According to Orlikowski and Baroudi (1991), the existence of a single research perspective in the IS field is not feasible; In their seminal paper, they recommend to prospective researchers to ensure their complete understanding of the underlying assumptions of each philosophical perspective before proceeding to adopt the one that they think is the most suitable for the nature of their study as well as compatible

with their interests and dispositions while at the same time remain open to other schools of thought. As a result, the diversity and plethora of research approaches render the researcher's choice of paradigm a very difficult and complex task. For the current study, the positivist approach was selected as the underlying philosophical paradigm after considering all differences between the three approaches as well as the relationship of the researcher with the design of the study (Hall and Howard, 2008).

From an ontological perspective, the current study shows clear evidence of 'formal propositions, quantifiable measures of variables, hypotheses testing'(Orlikowski and Baroudi, 1991, p. 5) as positivist researchers seek to formulate propositions depicting independent and dependent variables and the relationships between them (Myers, 2011). In the current study, the researcher developed a theoretical framework portraying the relationships among the investigated variables, which are then translated into formulated hypotheses that will be tested in order to validate the model. Furthermore, as previously mentioned, the researcher of the study has a passive and objective role regarding the investigated phenomenon as there is no involvement in the execution of the study. Along with the beliefs of the positivist philosophy, the researcher of the present study believes that reality is objective and exists independently of human beings comparing to interpretivists who believe the subjective meaning of reality constructed through human and social interaction processes.

From an epistemological perspective, positivists believe in the deductive testability of theories by empirically testing hypotheses that can be validated or falsified while also they seek generalizability of their empirical results (Chen and Hirschheim, 2004). In accordance with the positivists' assumptions, the current study developed a priori the proposed hypotheses along with the direction of these relationships (positive or negative) thus adopting a deductive perspective aiming to achieve generalizability of results. Moreover, all constructs of the proposed model were measured with instruments adapted from existing literature with already established validity and reliability.

Overall, the choice of the positivist paradigm as the underlying philosophical approach of the current study was conducted under the premise that it was determined as the most suitable paradigm for the nature of the current study as well as in accordance with the interests of the researcher.

4.3 Research Methodology

After choosing the most appropriate philosophical paradigm for the execution of the study, the researcher proceeds to the selection of the research methodology or else strategy of inquiry that will provide direction towards the achievement of the objectives of the study.

Extant literature theorizes two types of research or strategies of inquiry; quantitative and qualitative. Each one of the research approaches includes a range of methods that facilitate data collection. There has been a tendency in extant literature to associate quantitative methods with the positivist paradigm and qualitative methods with the interpretivist paradigm; Although some authors are using the terms interchangeably indicating that each of the paradigms is connected only with one type of research approach, a considerable amount of seminal studies in the field have argued that the choice of research methods is independent of philosophical positions thus a study under one paradigm can adopt any of the existing research methods such that a qualitative research may be positivist, interpretivist or critical depending on the philosophical assumptions of the researcher (Myers, 1997). For example, a case study approach can be undertaken under the positivist paradigm while the critical paradigm can be adopted in an action research (Carr and Kemmis, 1986).

The research methodology of a study encompasses certain research methods or techniques defined as the activities that are undertaken by the researcher aiming to collect data for his research study such as the execution of an ethnography or field study, conducting interviews or administering an online questionnaire. Characterized as instruments that aim to help the researcher in order to understand the investigated

phenomenon, research methods generate information about different aspects of the world (Mingers, 2001).

4.3.1 Qualitative and Quantitative research techniques

Qualitative research techniques were developed in order to enable researchers to study social and cultural phenomena. In contrast with the quantitative approach (as depicted in table 4-2), qualitative research collects and analyses data in the form of words rather than numbers, emphasizing in an inductive approach thus generating theories out of the gathered and analysed data (Bryman and Bell, 2011). According to Creswell, (2009, p. 4), 'qualitative research is a means of exploring understanding the meaning individuals or groups ascribe to a social or human problem'. The main data collection techniques under the qualitative strategy are interviews, observations and archival research while the data analysis is primarily done through textual analysis using methods such as hermeneutics, semiotics or grounded theory (Myers, 1997).

Quantitative	Qualitative
Numbers	Words
Researcher distant	Researcher close
Generalization	Contextual understanding
Hard and reliable data	Rich and deep data
Theory testing	Theory emergent

Table 4-2 Differences between quantitative and qualitative research [adapted from (Bryman and Bell, 2011)

Quantitative research has been characterized as the dominant strategy under the positivist paradigm and adopted by a great amount of studies in the IS field (Orlikowski and Baroudi, 1991; Mingers, 2003). Quantitative research is focused on collecting and analysing data that entails a deductive approach where the focus of the research is to test a theory, usually but not necessarily, through the formulation of

hypotheses and achieve generalization of results from the sample to the whole population (Bryman and Bell, 2011). According to Zikmund, (2010, p. 135), quantitative research 'addresses research objectives through empirical assessments that involve numerical measurement and analysis approaches' while Creswell, (2009) notes that quantitative research tests objective theories by examining the relationships between variables, measured through instruments, and gather numbered data that is analysed through statistical procedures. Surveys and controlled experiments constitute the main data collection methods associated with quantitative research while inferential statistics is the main tool that researchers deploy under this approach in order to validate or falsify their testing theories (Orlikowski and Baroudi, 1991; Creswell, 2009).

In agreement with the definition, focus and techniques of the quantitative research strategy, the current study selected it as the main research methodology as a means to fulfil the overall aim of the study; reveal the effects of mindfulness on technostress and strain variables by gathering data through a survey-based approach, empirically testing the conceptual model and developed hypotheses and proceeding to statistical data analysis in order to draw generalized conclusions from the investigated sample. Aiming to validate the proposed theoretical framework and thus the formulated eight hypotheses (Chapter 2 and 3), the researcher developed and deployed an online questionnaire that measured the investigated constructs through instruments already validated from extant literature. Numerous similar studies conducted in the IS field, and more specifically focusing on the investigation of technostress have adopted the quantitative approach in order to examine its effects on organizational outcomes thus adding to the existent motivation of researcher for the choice of quantitative methodology. As a result, from the above it becomes apparent that the quantitative approach was the most suitable as the main strategy for the execution of the present study. However, in the second phase of the data collection of the study, the researcher decided to conduct supplementary interviews, in order to dig deeper into the investigated phenomenon and reveal more richer insights. As a result, the current study deployed a mixed method approach with a quantitative approach in the first phase, as a primary method, informing the second

phase including a qualitative technique. In the next section, the mixed method approach will be discussed in more detail.

4.3.2 The Mixed Method Approach in the current study

As research methodologies continue to evolve, mixed methods research has gained increased attention and popularity from extant literature recognizing it as the third major research methodology next to quantitative and qualitative research (Kelle, 2006; Johnson, Onwuegbuzie and Turner, 2007; Hall and Howard, 2008). Nowadays, there is an extensive body of literature using mixed method research conducting fruitful research and taking advantage of the benefits it encompasses (Mingers, 2001; Bryman and Bell, 2011). Furthermore, a considerable amount of studies have been arguing and supporting the idea that the combination of quantitative and qualitative research under the same 'umbrella' paradigm utilizes the strengths and advantages of both strategies as well as broadens the understanding of the investigating phenomenon (Hall and Howard, 2008; Creswell, 2009). According to Johnson, Onwuegbuzie and Turner, (2007, p. 123):

> Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration.

Although previous studies have criticized the mixed method approach claiming that it is inappropriate to combine research methods that belong to different philosophical paradigms due to epistemological differences, Guba and Lincoln (1994) explicitly note that both quantitative and qualitative methods can be adopted under any research paradigm. Moreover, (Teddlie and Tashakkori, 2010) argue that due to methodological eclecticism, the researcher is free to choose and combine research methods in order to answer the research questions of his study.

As a means that enables a deeper understanding of the investigated phenomenon, mixed methods approach was selected as the research methodology of the current study. By combining multiple research methods, the researcher can get more reliable and richer results while also overcome the integral limitations and problems of a mono-method approach by complementing the strengths and weakness of each of the methods in association with the investigated research problem (Mingers, 2001; Teddlie and Tashakkori, 2010). Teddlie and Tashakkori, (2010, p. 286) argue that methodological eclecticism, or else the combination of quantitative and qualitative methods, expect from eliminating the respective weaknesses of each approach involves 'selecting and then synergistically integrating the most appropriate techniques from a myriad of … methods' so that the researcher chooses the best tools in order to answer the research questions of his study. Thus, complementarity is a major advantage of using a mixed method approach. According to Mingers (2001), as the world we live in is considered multidimensional, by adopting a mono-method approach the researcher 'sees' only one angle of the investigated research problem. Furthermore, since every research study cannot be perceived as a single event but rather as comprised of several phases, a multi-method approach can address effectively all phases with each method being useful at a different phase of the research thus offering a more comprehensive result. Another advantage of the multi-method approach constitutes in triangulation; Defined as the validation of data and results by combining research methods and data collection techniques, triangulation enables the researcher to cross check the results associated with one research strategy with the ones arising from another research method (Mingers, 2001; Bryman and Bell, 2011; Myers, 2011). Triangulation improves the confidence of the researcher on his results, can lead to deeper and richer data, encourage creativity and 'trigger' the development of innovative techniques for data collection as well as reveal contradictions (Johnson, Onwuegbuzie and Turner, 2007; Bryman and Bell, 2011). Morse (1991) describes two different ways of triangulation: sequential triangulation, when the results of one approach become input for the second approach and simultaneous triangulation, where the researcher collects data concurrently with both research methods. Similar to this taxonomy of

methodological triangulation, Creswell, (2009) argues six mixed method approaches that a researcher can follow:

- **Sequential explanatory strategy,** referring to the collection and analysis of quantitative data during the first phase of the study informing the execution of the second phase of the study including qualitative methods.
- **Sequential exploratory strategy**, described as the reverse of the previously mentioned method; the first phase of the study is focused on collecting and analysing qualitative data while during the second phase the researcher deploys a quantitative method.
- **Sequential transformative strategy**, characterized as a two-phase project adopting a theoretical lens where one method is followed during the initial phase and a second one during the next phase.
- **Concurrent triangulation strategy**, described as the simultaneous use of both quantitative and qualitative methods for the collection of data which are then compared in order to reveal convergence or differences.
- **Concurrent Embedded strategy,** similar to the concurrent triangulation strategy, where the researcher adopts a one phase data collection deploying both quantitative and qualitative methods but one of them is considered as primary technique and one of them as secondary, embedded into the first one.
- **Concurrent Transformative strategy**, referring to the simultaneous use of methods for data collection which is guided by a specific theoretical perspective.

The current study follows the sequential explanatory strategy, collecting and analysing quantitative data at the first phase and then using these results in order to inform the second phase of the study that followed a qualitative approach. The two phases are separate but connected. The weight of the study is on the quantitative data derived from the online questionnaire that the researcher developed and distributed to the targeted population. By deploying this strategy, the researcher is able to explain and understand in more depth quantitative data through the follow up qualitative data (Johnson, Onwuegbuzie and Turner, 2007; Creswell, 2009). The

researcher has chosen the mixed methods designed research, as the combination of quantitative and qualitative tools can reveal different aspects of the investigated phenomenon; quantitative methods offer a comprehensive understanding of the 'bigger' picture of the research problem at hand while qualitative methods provide information and insights that can reveal in-depth explanations of the investigated phenomenon (Kelle, 2006). Furthermore, the quantitative stage of the present research prepares the foundation for the selection of the participants that will be interviewed in the second follow up phase of the research (Bryman and Bell, 2011). Moreover, a qualitative investigation allows to explore in more depth the relationship between the investigated variables of the proposed model of the study (Bryman and Bell, 2011). During the data analysis stage, qualitative methods can validate the results of the quantitative analysis while also aid the researcher's understanding of the investigated phenomenon (Johnson, Onwuegbuzie and Turner, 2007).

When planning a mixed methods research, the researcher should ensure taking into consideration the following aspects:

- **Timing:** The timing of the data collection is very important in a mixed methods research; The researcher needs to decide whether the data will be collected in separate phases (sequentially) or at the same time (concurrently).
- **Weighting**: The weight or priority given to the quantitative or qualitative methods constitutes a crucial aspect of a mixed methods approach. Depending on the interests of the researcher, the audience of the study and the elements that the researcher seeks to emphasize, weighting could be equal or devoting attention to one method more than the other.
- **Mixing:** Mixing describes the combining of the collected quantitative and qualitative data during several stages such as the data collection, the data analysis or interpretation stage. Mixing can be characterized as connected, when the researcher combines the data gathered from the first phase with the collected data from the second phase, integrating, when the researcher merges the data gathered from both methods and embedded, where the researcher incorporates a secondary form of data in the primary database.

- **Theorizing perspectives**: The adopted theoretical perspective or else theoretical lens that guides the design of the study plays a significant role in the data collection and analysis.

In the present study, the researcher decided to conduct two phases for data collection (timing), assigning more weight on the quantitative method than the qualitative, which would act as providing additional, supporting information (weighting), mixing will be conducted in the discussion chapter of the study while the theorizing perspectives have been declared in Chapter 2 and 3; Mindfulness has been adopted as a theoretical lens to investigate the phenomenon of technostress within organizational settings. Also, the transaction model of stress has been serving as the baseline foundation of the theoretical framework of the present study.

4.4 Research Design of the current study

According to Bryman and Bell, (2011, p. 40), a research design constitutes one of the most important elements leading to the achievement of a successful research project as 'it provides a framework for the collection and analysis of data.' As depicted in Figure 4-1, the research design can be described as the plan or roadmap of a research study including decisions about the most essential components of it such as philosophical assumptions, research methods, data collection techniques and data analysis methods (Myers, 2011). Depending on the nature of the research problem as well as on the researcher's personal experience and the audience of the study, the researcher will take the most appropriate decision regarding his choices embedded in the research design (Creswell, 2009).

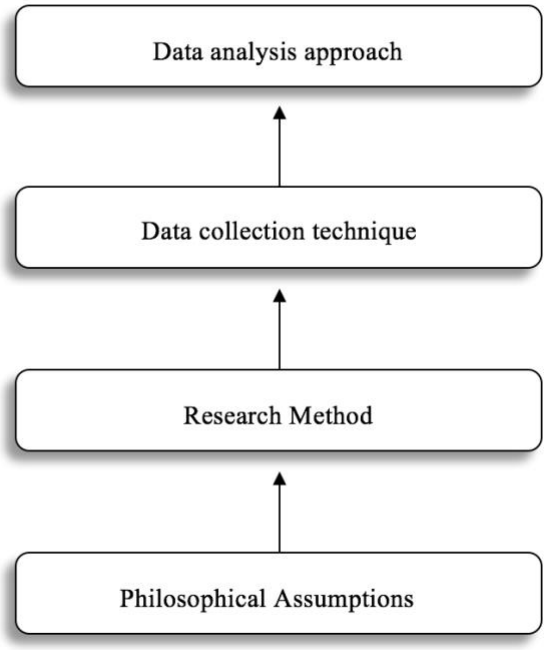

Figure 4-1 A model of research design (adapted from Creswell, (2009))

The present research study was carried out in two phases:

During the first phase, an extensive literature review was undertaken in order to investigate in depth the phenomenon of technostress, its effects on working individuals and organizational outcomes. Furthermore, the concept of mindfulness was thoroughly examined, aiming to explore its role as a mechanism or technostress inhibitor that can alleviate technostress stressors, and provide the necessary theoretical foundation underlying the proposed theoretical framework of the study. As a result, the integrative literature review enabled the synthesis of extant literature leading to the development of the proposed conceptual framework of the study and its proposed hypotheses. An online survey, developed by adopting previously existing in the literature measurement instruments, was distributed by the researcher to a number of participants aiming to test the hypotheses generated from the proposed theoretical model. Overall, 500 people participated in the online questionnaire of the study, achieving a very good sample size required for deploying Structural Equation Modeling (SEM) in the data analysis stage. During the second phase of the study, a follow up qualitative research was conducted based on the

findings of the online survey.

The second phase of the study involved a number of semi-structured interviews with working individuals that already participated in the first phase and expressed their interest into participating in a follow up study. The aim of the second phase was to investigate in more depth the relationship of mindfulness and technostress as well as explore the effects of mindfulness on each one of the five stress creating conditions. In Figure 4-1, the previously described research design interrelated step by step process of the current study is presented.

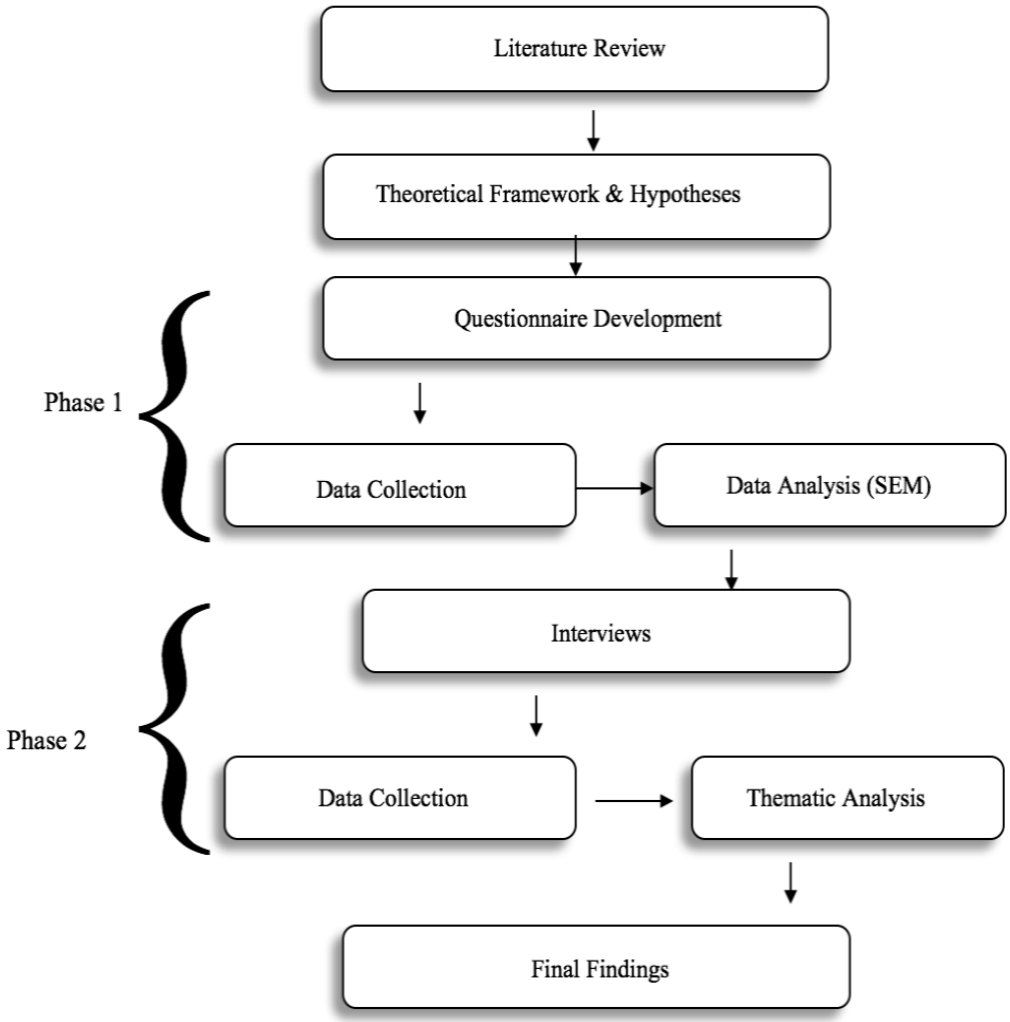

Figure 4-2 Research design step by step process

Adopting the positivist philosophy as the underlying theoretical assumption, the current study followed a mixed method strategy of inquiry including both quantitative and qualitative research, conducting an online survey as well as semi-structured interviews as data collection research methods and Structural Equation Modelling (SEM) and thematic analysis accordingly as data analysis techniques. Figures 4-2 and 4-3 summarize the research design decisions of the researcher for the present study.

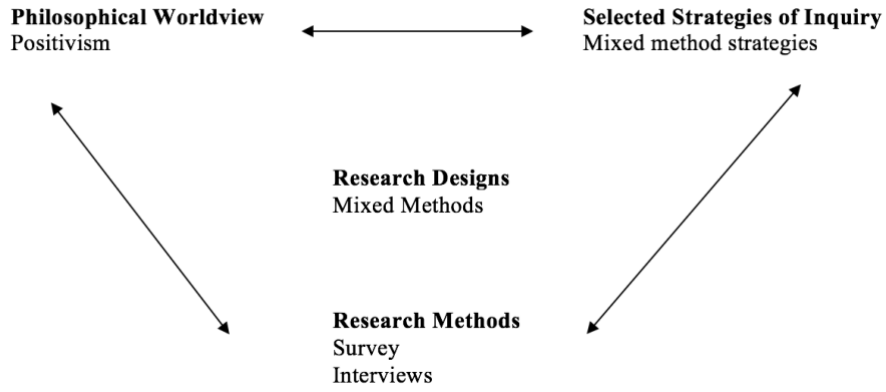

Figure 4-3 Decisions adopted in the present study

4.5 Research Strategy - Data Collection Techniques

4.5.1 Survey-based approach

Surveys constitute one of the most widely accepted and deployed strategies in the IS field. Having adopted a quantitative approach as the main strategy of inquiry of the present study, the researcher followed a survey-based approach aiming to obtain data in a standardized and systematic way as well as discover patterns that can be generalized from the collected sample to a larger population (Oates, 2006). Mostly associated with the positivist paradigm, the survey-based approach was considered as the most appropriate and suitable data collection technique as the aim of the

researcher was to extract information and explore several industries and sectors as well as include people from different backgrounds; providing deep insights and richness to our results thus fulfilling the objectives of the current study.

In the present study, a survey-based approach was adopted by developing an online questionnaire as a data generation method and using Structural Equation Modeling as a data analysis method. The data generation techniques and data analysis methods will be discussed in more detail in the next sections.

4.5.2 Questionnaire Design and Development in the current study

A questionnaire can be defined as a set of predefined questions (items) organized in a predetermined order (Oates, 2006) that can be distributed by post, mail or online (Bryman and Bell, 2011). A self-administered online questionnaire was selected as the main data collection technique of the present study as the researcher (Oates, 2006; Cooper and Schindler, 2009; Bryman and Bell, 2011):

- Aimed to obtain data from a large group of people, in a quick, economical and efficient way that would enable him to produce generalized results from the sample to a wider population.
- Aimed to deploy a data collection method that offers increased anonymity and confidentiality as well as provides more time to respondents to answer to the selected questions.
- Aimed to collect brief information from respondents in a systematic, standardized and identical way so that generalized conclusions can be drawn.

A self-administered questionnaire does not require the presence of the researcher thus it benefits from the absence of the interviewer effects, allows the deployment of more complex instruments as well as can reach inaccessible people in high positions (CEOs) (Cooper and Schindler, 2009). Furthermore, similar studies in the IS field investigating the phenomenon of technostress have also adopted a survey-based approach distributing a questionnaire in order to collect the necessary data for the

execution of their investigation ((Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Ayyagari, Grover and Purvis, 2011; Srivastava, Chandra and Shirish, 2015; Tarafdar, Pullins and Ragu-Nathan, 2015; Fischer and Riedl, 2017) thus increasing the motivation of the researcher for the deployment of this method .

An online questionnaire was designed and developed during the present study, aiming to fulfil the set objectives and thus the overall aim of the study. The questionnaire was developed over a period of four months (May 2016-September 2016). During this time, the researcher reviewed carefully and thoroughly existing literature on the investigated concepts aiming to ensure that all essential data will be collected; identify the variables that need to be measured that would enable the achievement of answering the research question of the study (Saunders, Lewis and Thornhill, 2009). All questionnaire items were adopted from existing literature and more specifically from studies that have already confirmed the reliability and validity of the instruments.

Following the guidelines of seminal authors (Sekaran, 2003; Saunders, Lewis and Thornhill, 2009; Zikmund, 2010) for questionnaire design, the researcher developed an online survey utilizing the BOS online survey tool, facilitated by Brunel University. The questionnaire consisted of nine (9) pages totally, including an introductory page where the respondent was provided with an information sheet describing briefly the aim of the study, the rights of the respondent concerning anonymity and confidentiality as well as the contact details of the researcher and her supervisor (Appendix A). The questionnaire was divided into six (6) sections, where Section 1 consisted of the introductory page, Sections 2-8 included the instruments measuring the independent and dependent variables of the study while Section 9 included the demographic questions such as gender, age and educational background items. Section 9 included a 'Thank you' note while also offered the option to register the respondent's interest to participate in the second phase of the study. Taking into account ethical considerations, Section 8 included a link directing the respondent to a new web page where he could type his email address. In this way, email addresses were collected in a separate survey, different from the main survey, ensuring the

anonymity of the respondents so that their answers in the main questionnaire would not be associated with any personal details.

The operationalization of the constructs measuring the independent and dependent variables of the proposed theoretical model was conducted as follows:

Section 2&3: These sections aimed to assess the levels of trait mindfulness and IT mindfulness of the individuals participating in the online survey.

- **Mindfulness:** Mindfulness refers to a dynamic, rich state of awareness and alertness along with a heightened state of involvement; a mindful individual pays attention to the present moment and is not ruminating about the past or thinking about the future. In the current study, mindfulness is depicted as a trait; all individuals are considered to be mindful at one moment or another. After reviewing extant literature, the researcher decided to adopt the Mindful Attention Awareness Scale (MAAS) (Brown and Ryan, 2003) for the assessment of the mindfulness levels of the targeted individuals, as a relatively short scale was required for the purposes of the study as well as the researcher was interested to capture a general mindfulness score (Sauer et al., 2013). MAAS has been characterized as one the most widely accepted and used measurement scales in extant literature while also has been validated and received strong support by numerous studies and research contexts thus providing increased confidence to the research study (Sauer et al., 2013). Consisting of 15 items, the MAAS scale measures mindfulness including a six-point scale rating the frequency of occurrence of every experience from Almost Always (1) to Almost Never (6) measuring questions Q1.1-Q1.15. Example items include: 'I could be experiencing some emotion and not be conscious of it until sometime later' and 'It seems I am 'running on automatic' without much awareness of what I'm doing'.
- **IT mindfulness:** IT mindfulness refers to a dynamic, IT specific trait that becomes evident when an individual is working with technology; an IT mindful individual is paying great attention to detail, is focused at the present moment and is willing to exploring alternative uses of technology. The construct of IT mindfulness was operationalized by J. Thatcher et al.,

(forthcoming)and their developed instrument is adopted in the current study. As the researcher aimed to assess IT mindfulness levels of individuals taking part in the online survey and was interested in a relatively short scale, this study adopted the short version of the IT mindfulness scale that has already been validated by previous studies (Thatcher et al., forthcoming). The short scale consists of four (4) items each one measuring the four dimensions of IT mindfulness: Alertness to distinction, Awareness of multiple perspectives, Openness to novelty and Orientation in the present. Example items include: 'I am very creative when using this technology' and ' I like to figure out different ways of using this technology'. A five-point Likert scale was used ranging from Strongly Disagree to Strongly Agree measuring questions Q2.1-Q2.4.

Section 4&5: These sections aimed to measure the end user performance (stated as job performance in the questionnaire for sake of simplicity), job satisfaction and end user satisfaction of the respondents.

- **End User Performance:** End user performance refers to the degree that individuals use technologies to enhance their work performance and outcomes (ICT enabled productivity) as well as the extent to which technology usage contributes positively to technology mediated tasks (ICT enabled innovation) (Tarafdar, Tu and Ragu-Nathan, 2010). Grounded on the study of Tarafdar, Tu and Ragu-Nathan, (2010), this study adopted the end user performance construct from the study of Torkzadeh and Doll, (1999) where it is operationalized as consisting of two dimensions namely ICT enabled productivity and ICT enabled innovation. Consisting of 7 items, the measurement of the end user performance construct included items such as 'This technology helps to improve my productivity' and 'This technology helps me to identify innovative ways of doing my job'. A five-point Likert scale was used ranging from Strongly Disagree to Strongly Agree measuring questions Q3.1-Q3.7.
- **Job Satisfaction**: Job satisfaction reflects all the feelings and attitude that an individual expresses towards his job (Reb, Narayanan and Ho, 2015). In the

present study, the researcher adopted the construct from the study of Cammann et al., (1979). The instrument consists of three items with an example being 'All in all, I am satisfied with my job'. A five-point Likert scale was used ranging from Strongly Disagree to Strongly Agree measuring questions Q4.1-Q4.3.

- **End user satisfaction**: End user satisfaction, or else as called employee satisfaction with ICT use, refers to the feelings of an individual following an IT usage experience (Bhattacherjee and Premkumar, 2004). In this study, the construct of end user satisfaction was adopted from the study of Bhattacherjee, (2001). The measurement instrument for this construct consists of one question 'How do you feel about your overall experience of utilizing ICTs in connection with your work tasks?' and the respondent is asked to rate his feelings in semantical differential scale: Very dissatisfied/Very satisfied, Very displeased/Very pleased, Very frustrated/Very Contented, Absolutely Terrible/Absolutely Delighted with a five point Likert scale in the questions 5.1-5.5.

Sections 6&7: These sections aimed to measure the levels of technostress experienced by individuals participating in the online survey of the current study.

- **Technostres**s: Technostress refers to the stress experienced by individuals in organizations due to the extended use of ICTs. In this study, the technostress construct was adopted from the seminal study of Ragu-Nathan et al., (2008) who operationalized and developed the instrument for the measurement of this construct; The technostress instrument has been deployed and validated by numerous studies in IS field (Ragu-Nathan et al., 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Fieseler et al., 2014; Tarafdar, Pullins and Ragu-Nathan, 2015). The instrument measures the levels of technostress that individuals experience within workplace settings and consists of 23 items measuring the five dimensions, or technostress creators, that all together create the construct of technostress: techno overload, techno invasion, techno complexity, techno uncertainty and techno insecurity. Example items reflecting each

one of the stressors include 'I am forced by this technology to work much faster', 'I spend less time with my family due to this technology', 'I need a long time to understand and use new technologies, 'I am threatened by co-workers with newer technology skills' and 'There are always new developments in the technologies we use in our organization'. A five-point Likert scale was used ranging from Strongly Disagree to Strongly Agree measuring questions Q9.1-Q11.9.

Sections 8: This section included questions Q12-Q17 aiming to measure the demographic background of the respondents.

- **Demographic Characteristics**: Gender, Age and Educational Background constitute the demographic variables that were included in the online survey. Consisting of three questions with a nominal scale, the demographic measures were included at the last part of the questionnaire as they are considered as easier and quicker questions and can facilitate a seamless and stress less experience to the respondents. Moreover, the demographic characteristics were important for the data analysis as they act as potential moderators or control variables in the proposed theoretical model.
- **Total working experience, current working experience**: These variables refer to the total working experience of the individual as well as his working experience with the current employer. Two questions were used in order to measure these two variables using a nominal scale. The variables were considered as very important to measure, as they are potential moderators or control variables in the proposed theoretical model.
- **Daily average technology usage at work**: Refers to the average time that an individual spends on using technology at work in order to complete his work tasks. The construct was adopted from the study of (Maier, Laumer and Eckhardt, 2015) and is measured with 1 item, on a nominal scale, indicating the hours of IT usage at work. The variable was deemed as very important to measure, as it is a potential moderator or control variable in the proposed theoretical model.

4.5.3 Pilot study

A pilot study is an essential step before administering a self-administered survey in order to detect weaknesses in the design of the questionnaire as well as ensure that the survey functions well as a whole. Therefore, the researcher can refine the survey questions and avoid the occurrence of any fatal flaws in the final questionnaire (Cooper and Schindler, 2009; Zikmund, 2010; Bryman, 2012). Moreover, pilot testing serves as a tool in order to ensure the validity of the questions and the reliability of the data that will be collected (Saunders, Lewis and Thornhill, 2009).

In the present study, as already mentioned in section 4.5.3, all items (questions) used in the current questionnaire were adopted from existing literature that has already established the validity and reliability of the adopted constructs in various contexts and populations. In more detail, the adopted constructs were tested in similar contexts by previous studies thus supporting their applicability for the present study (Carlson and Brown, 2005; Tarafdar, Tu and Ragu-Nathan, 2010; Tarafdar, Pullins and Ragu-Nathan, 2015). For the current study, face validity was established by asking the opinion of field experts while content validity and reliability were confirmed by the results of the pilot study analysis that will be presented in more detail in Chapter 5.

4.5.4 Sampling

Before proceeding to the actual data collection, the researcher needs to consider the matter of sampling. Sampling can be defined as the process of selecting some of the cases of the whole population, or else called as sample, that can act as representatives and allow the researcher to draw conclusions from them about the entire population (Cooper and Schindler, 2009). Sampling is an essential procedure during the execution of a research project; Time, financial and access restrictions can significantly hinder the data collection and data analysis process. Sampling techniques provide a range of methods that researchers can use in order to collect and analyse data from a smaller sub group of the population in interest. By

considering a sample instead of the whole population for a research study, the researcher benefits from lower costs, saving of time, quicker data collection and data analysis as well as increased accuracy of results (Cooper and Schindler, 2009; Saunders, Lewis and Thornhill, 2009).

Sampling techniques can be divided into probability sampling and non-probability sampling procedures; While in probability sampling an element has a known, non zero probability of being selected from the population, in non-probability sampling any member of the population has an unknown probability of being chosen. In the first category, random sampling, the researcher can select from a wide range of methods namely: systematic sampling, stratified sampling and cluster sampling techniques that are discussed below.

- **Random Sampling**: Constitutes the purest, most basic and simple form of probability sampling. In general terms, each unit of the population has an equal probability to be chosen and considered into the sample. Under this method, the researcher chooses at random cases either by using random number tables or with the aid of a computer program that generates random numbers (Oates, 2006; Cooper and Schindler, 2009; Saunders, Lewis and Thornhill, 2009).
- **Systematic Sampling**: Considered as a variation of the random sampling technique, systematic sampling does not require the use of random number tables but instead the researcher adopts a system of choosing cases at a regular interval from the population (Cooper and Schindler, 2009; Saunders, Lewis and Thornhill, 2009).
- **Stratified Sampling**: Characterized as a modification of random sampling, stratified sampling involves diving the population into two or more subgroups, or else called strata, depending to some specific attributes such as salary grade or alphabetical order. Then, the researcher chooses randomly cases from each one of the created sub groups (Cooper and Schindler, 2009; Saunders, Lewis and Thornhill, 2009; Zikmund, 2010).
- **Cluster Sampling**: Similar to stratified sampling, cluster sampling involves the division of the population into discrete subgroups of else called clusters.

Characterized as the most economically efficient sampling technique, cluster sampling involves creating groups according to natural occurring characteristics such as areas or organizations. After the creation of the clusters, the researcher uses random sampling in order to select few of the clusters and collect data from every case inside them (Cooper and Schindler, 2009; Saunders, Lewis and Thornhill, 2009; Zikmund, 2010).

In the category of non-probability sampling, the techniques of purposive sampling, snowball sampling and convenience sampling are provided as available options to the researcher.

- **Purposive Sampling**: Purposive sampling allows the researcher to use his judgement in order to select the cases that will be included in the sample. It is very often used when the researcher is working with small samples, such as conducting interviews or case study research, and he is selecting cases that will produce valuable data for meeting the objectives and thus the aim of the research (Oates, 2006; Saunders, Lewis and Thornhill, 2009).
- **Snowball Sampling**: Snowball sampling includes as a first step the deployment of probability or other methods in order to make the initial selection of respondents; then the researcher obtains additional cases by asking the initial respondents to refer them to more potentially interested participants that have similar characteristics and are relevant to the research topic. As a result, individuals are discovered from referrals provided by the previous respondents thus creating a 'snowball' effect. This sampling technique is usually deployed when it is difficult for the researcher to identify members of the desired population (Oates, 2006; Saunders, Lewis and Thornhill, 2009).
- **Convenience Sampling**: Convenience sampling allows the researcher to obtain people by selecting the cases of the population that are easier to reach, more accessible and available to the researcher. Benefiting from high response rates, this strategy constitutes a quick and economical way to gather data while also it is a highly efficient method in order to obtain a large

number of completed questionnaires (Oates, 2006; Cooper and Schindler, 2009; Saunders, Lewis and Thornhill, 2009; Zikmund, 2010).

The overall aim, set objectives, research question and research strategy of the study as well as the required size of the sample constitute the critical factors that influence the decision of the researcher regarding the sampling technique.

4.5.5 Justification of the Sampling Technique for this study

The present research selected Convenience Sampling, with some elements of snowball sampling, to guide the data collection and analysis for the purposes of the study. In the beginning, the researcher sent the online survey to a group of initial participants, fulfilling the study's sample requirements thus being knowledge workers, and asked them to forward the survey to additional potentially interested participants. In addition, the researcher published the online survey on professional social networks (ex. LinkedIn) in order to achieve high response rates.

The targeted population of the current study was set as working individuals that use technology at work daily, or as referred in the academic literature as 'knowledge workers'. According to extant literature, knowledge workers are defined as employees involved with tasks characterized as more mental than physical (Benson and Brown, 2007; Simperl *et al.*, 2010); They perform complex tasks, including the production, process and distribution of information, that demand problem solving abilities (Karr-Wisniewski and Lu, 2010). For a knowledge worker, the main tool and output is knowledge while the main task being executed is thinking. Knowledge work is usually associated with high tech, business and informational services sector organizations (Benson and Brown, 2007). Knowledge workers are usually thought as university graduates having obtained academic qualifications and received at least graduate level education (Brinkley *et al.*, 2009).

The reasons for the decision of the selected sampling technique are discussed below:

- The advance knowledge of the characteristics of the population that is targeted for the data collection is a critical criterion for the selection of the

sampling technique. A lack of lists of the members of the interested population, or else called as sampling frame, automatically rules out the deployment of probability sampling techniques thus leading the researcher to choose non-probability ones (Zikmund, 2010; Stangor, 2011). According to Stangor, (2011), it is possible for researchers to encounter situations where there is no sampling frame available, thus 'non probability samples must be used'(Stangor, 2011, p. 113). In the present study, the researcher aimed to investigate the effects of mindfulness on technostress within organizational settings. As a result, in order to investigate this phenomenon the researcher determined that the targeted population was considered to be working individuals, occupied either full time or part time, using technology daily in order to complete their work tasks. Currently, no list is existing including these members of the population thus no sampling frame could be obtained. As a result, since there was no feasibility of following a probability sampling method, thus the researcher had to choose one of the non-probability sampling techniques.

- Another criterion that dictates the selection of the sampling technique is the available resources that the researcher has at hand. Due to limited time and financial resources, the selection of the Convenience sampling method for the current study enabled the researcher to collect quickly, efficiently and economically large amounts of data needed for the execution of the study and data analysis with Structural Equation Modeling (Zikmund, 2010).
- The convenience sampling method is considered as one of the most common and extensively used sampling techniques in social sciences (Zikmund, 2010) as well as behavioural sciences (Stangor, 2011). By deploying the convenient sampling technique, the researcher obtains participants that are readily available thus constituting it a quick, efficient solution that can be used in order to test research hypotheses (Stangor, 2011). Despite the fact that convenience sampling might limit the generalisability of results to other populations, Stangor, (2011, p. 256) argues that 'any sample of research participants, no matter who they are, will be limited in some sense',

highlighting that it is not feasible for a researcher to choose a representative sample of all people that live in the world and test the applicability of a theory across several cultures and places. As a result, true generalization across all human beings is not possible. For this reason, scientists, especially in the behavioural sciences field, tend to undertake a simple assumption; unless there is a specific reason to believe the opposite, relationships between variables that are observed between a group of people will also be valid in other groups of people as well (Stangor, 2011). In the current study, the researcher chose knowledge workers, working individuals who use daily technology at work, as the targeted population of the study. Since the targeted population seems to have the same basic characteristics as all other human beings, the researcher makes the assumption that the relationships that will be found between the variables will be valid for other groups of people (Stangor, 2011).

- The current study has undertaken a careful, well deployed design, using valid measurement instruments in order to collect and analyse data that will allow the testing of the proposed theoretical model. The researcher acknowledges the advantages as well as limitations of the convenience sampling technique and caution will be undertaken for the generalization of results to the whole population. However, the demographics of the sample showed very similar characteristics and attributes with the demographics of the population, such as educational background and daily technology usage, thus it can be argued that although the study deployed a non-probability technique the sample is typical of the population. The targeted population in the current study is set as knowledge workers who according to extant literature are characterized as university graduates having received higher level education and obtained academic qualifications. Results for our analysis showed that 80% of the respondents of our sample have obtained either a Bachelor or a Master's degree while 11% have reached a PhD level thus showing that our sample is highly educated reaching the standards of a typical knowledge worker population. Furthermore, according to Brinkley et al., (2009), the core of the

knowledge workers are concentrated between the ages of 25-34 and 35-44; Results for our analysis showed that 49,20% of respondents our sample are in the 26-35 age range while 22,40% are in 36-45 group thus revealing that almost 72% of the respondents belong to the 25-45 age category. At last, Brinkley et al., (2009) posit that computerisation has a great impact on knowledge workers who are using computers and general technology at work as a means to assist and enhance their work tasks and processing; in our sample, 97% of the respondents use technology daily for work tasks. As a result, it becomes apparent that the demographics of our sample render it as very similar to the whole population of knowledge workers thus we can assume that the sample of the current study is typical of a knowledge worker population (Stangor, 2011).

Furthermore, for the second phase of the study the convenience sampling technique was also used. During the quantitative data collection, 46 respondents, that had already completed the online questionnaire, registered their interest to participate in a follow up phase of the study and thus provided their contact details. In the second phase of the study, the researcher contacted these respondents in order to arrange interviews that would allow the exploration of the investigated subject in more depth aiming to gain more insights about the relationship of mindfulness and technostress. The interviews were arranged depending on the availability of each participant and when data saturation was reached the researcher decided to terminate the second phase of data collection. The overall research design decisions of the present study are presented in the Table 4-3 below.

Level of Decision	Choice
Philosophical Assumption	Positivism
Research Strategy	Mixed Methods
Research Methods	Questionnaire, Interviews
Sampling Technique	Convenient Sampling
Unit of Analysis	Individuals
Subject of study	The effects of mindfulness on technostress, job related & IT usage related outcomes

Table 4-3 Summary of Research Design Decisions

4.5.6 Sample

As previously mentioned in section 4.5.5, the targeted population of the present study was very large and could not be estimated while also it was impossible to obtain a sampling frame for the specific population. Thus, the researcher had to choose a non-probability method of sampling in order to proceed to the execution of data collection. While with the deployment of probability techniques the researcher can use some rules to estimate the required sample size, non-probability techniques do not offer such estimates (Bryman and Bell, 2011). Nevertheless, the data analysis method that was chosen for the present study, Structural Equation Modeling in AMOS, is accompanied by rules of thumb or else guidelines that the researcher can follow in order to determine the sample size.

There has been a considerable amount of literature focusing on the subject of the required sample size for studies deploying SEM. According to Roscoe (1975), a sample size between 30 and 500 is considered as acceptable for any research while also highlights that in multivariate research the sample size should exceed more than 10 times the number of variables included in the proposed model. According to Kline (2005), a typical sample size for a study undertaking SEM is 200 cases. Kline (2005) argues that SEM is generally characterized as a large sample technique, although recently studies have empirically shown that smaller samples, ranging from 30-80 participants, are adequate for SEM analysis (Wolf *et al.*, 2013; Sideridis *et al.*, 2014). Moreover, Hair *et al.*,(2006, p. 637) claim that the sample size depends on several critical factors such as the complexity of the model and number of constructs included; while simple models can be tested with smaller sample sizes, more complex models need larger samples as 'larger samples mean less variability and increased stability'. According to Hair *et al.*, (2010), the minimum sample size for a study with seven or less constructs ranges from 150 to 300 while others have recommended 10 cases per indicator (variable) (Nunnally, 1978) or 5-10 cases per estimated parameter (Bentler and Chou, 1987).

In accordance with the recommendations of various seminal authors regarding the minimum required sample size for the execution of SEM analysis (Nunnally, 1978;

Bentler and Chou, 1987; Kline, 2005; Hair *et al.*, 2010), the present study estimated that the latent variables (constructs) of the model are six (6) and the observed variables (indicators) twenty (20), while the parameters are estimated to be around fifty (50). As a result, the researcher determined that the sample size required for the current study should be minimum 300 cases.

Furthermore, for the second phase of the data collection of the study the researcher decided to select a number of participants to undertake semi-structured interviews. The participants were selected with convenience sampling from the already collected sample of the quantitative part of the first phase. The interviews reached data saturation at the 10th interview so the researcher decided to stop the data collection at that point. Interviews constitute one of the various qualitative methods that one can use in order to reach data saturation. Data saturation is achieved when the researcher notices no new data, no new themes and no new coding from the undertaking of the interviews (Fusch and Ness, 2015) thus he determines that the gathered sample is adequate enough to proceed to data analysis. In the current study, data saturation was achieved at the 10th interview thus the sample size of the second phase was 10 participants.

4.5.7 Non Response Bias

Non response bias can appear in two forms: unit non response, when a respondent does not participate in the survey at all, and item non response, when the respondent does not answer some of the questions (items) of the online survey (Sue and Ritter, 2007). In order to determine the unit non response, the number of potential respondents must be known to the researcher. In the current study, the researcher deployed convenience sampling by sending an email to several potential respondents and asking them to forward the email to further potentially interested colleagues. Thus, the total number of potentially reached respondents is not feasible to be known. Regarding the non-response bias, the researcher can apply several remedies in order to ensure that it is not a concern in the present study. In Chapter 5, response bias will be discussed in more detail.

4.5.8 Interviews

According to Bryman and Bell, (2011), interviews constitute one of most widely and commonly used data collection techniques in a qualitative research study. While quantitative research, such as the online survey in this research, focuses on numbers and quantification, qualitative research, such as interviews in this study, emphasizes on words and contextual understanding (Bryman and Bell, 2011). By analysing the data gathered from interviews, the researcher can understand the 'what' and 'why' of a phenomenon and more importantly explore the 'how' (Saunders, Lewis and Thornhill, 2009). The three basic types of interviews that a researcher can deploy in a research study constitute in (Oates, 2006):

- **Structured interviews** use predefined, standardized, identical questions to all interviewees; The interviewer reads aloud the questions and notes down the answer of the respondent usually by deploying pre coded answers. Structured interviews are used by researchers in order to collect quantifiable data and thus they are characterized as 'quantitative research interviews' (Oates, 2006; Saunders, Lewis and Thornhill, 2009).
- **Semi-structured interviews** are conducted in a more flexible manner than structured interviews with the researcher having at hand a list of themes and questions, usually called as the interview guide, to be covered but these may vary from interview to interview. The researcher can omit or even add questions depending on the nature of discussion with the interviewee (Oates, 2006; Saunders, Lewis and Thornhill, 2009).
- **Unstructured interviews** usually start with the researcher introducing a topic and asking a question while then the interviewee is allowed to respond freely, elaborating and talking about events, behaviours and beliefs related to the subject in focus (Oates, 2006; Saunders, Lewis and Thornhill, 2009; Bryman and Bell, 2011).

In the current study, the second phase of data collection included the execution of semi-structured interviews with ten respondents that had already participated in the online survey of the first phase. By conducting interviews at the second phase of the

study, the researcher aimed to validate or else cross check the findings derived from the quantitative phase thus using interviews as a means of achieving triangulation (Bryman and Bell, 2011). The overall aim of the qualitative phase was to explore in more depth the relationships of the investigated variables, mindfulness and IT mindfulness with technostress stressors, and more specifically investigate how mindfulness affects each one of the stressors. As a result, the researcher deployed interviews aiming to obtain more detailed information and ask more complex questions in an open ended way so that the respondents could describe in detail their personal experiences of technostress in the workplace. In addition, the researcher wanted to explore in depth and understand how these individuals react and cope with events that are triggered by technology usage within the workplace environment. Aiming to explore the personal experiences of individuals in ICT induced stress conditions, the researcher determined that interviews constitute the most suitable and appropriate data collection method for the second phase of the study comparing to other means such as questionnaires or observations (Oates, 2006).

The researcher created an interview protocol based on the proposed theoretical framework of the study, extant academic literature on the concepts of technostress, mindfulness and stress within the workplace (Rose, 1998; Day *et al.*, 2012; Ninaus *et al.*, 2015) as well as the findings of the quantitative research part of the study. The research protocol included the main questions and themes that the researcher wanted to focus on during the interviews that would allow the respondent to describe their experiences as well as express their feelings and views (Appendix B). The interview questions were focused on uncovering: 1) the position and job of the respondent as well as his daily work routine, 2) how comfortable, or else computer literate, the respondent is with technology in general while also understand his technology usage at work, 3) stressing situations that the respondent has experienced at work caused by technology. In addition to the these questions, four scenarios were described to the respondents aiming to reveal and capture their coping strategies and reactions to stressors and specifically to the four technostress creators, namely techno overload, techno invasion, techno complexity and techno insecurity. Since in the quantitative analysis the fifth techno stressor, namely techno uncertainty, was dropped from the

SEM model, the researcher excluded it from the interviews accordingly. For each one of the stressors, the respondent was presented with a scenario and was asked to describe a similar situation that he has encountered at work providing details about his feelings at the time as well as his reactions and how he dealt with and resolved the ICT stressful situation. Through these scenarios, the researcher aimed to uncover and understand in depth the respondents' experiences of ICT induced stress and more importantly their reactions and coping mechanisms with each one of the technostress stressors.

Before the beginning of each interview, the researcher asked each participant to fill in a two-page questionnaire, including the same questions that were presented in the first two pages of the online questionnaire of the first phase of the study, aiming to assess his levels of mindfulness and IT mindfulness. The tests were used as a means of mindfulness assessment. In that way, by combining the level of mindfulness of each respondent with his responses to the stressors' scenarios the researcher gains the ability to validate the quantitative findings as well as understand in more depth the relationship between mindfulness and technostress.

The diversity of the sample was achieved by including a variety of occupations and job positions as depicted in Table 4-4. All interviews were tape recorded and transcribed. The limited available time of the participants didn't allow the researcher to perform extensive note keeping thus the recordings of the interviews were deemed as crucial and highly essential for the data analysis.

Id	Job description	Duration	Work experience
#1	Architect	00:15:50	2 years
#2	Marketing Executive	00:14:46	<1 year
#3	IT Support	00:16:44	14 years
#4	Insurance Executive	00:20:15	1,5 years
#5	Systems Accountant	00:39:50	4 years
#6	Business Analyst	00:17:22	3 years
#7	University Lecturer	00:28:26	1 year
#8	IT Advisor	00:21:38	12 years
#9	Management Consultant	00:20:10	5 years
#10	Social Media Manager	00:13:39	<1 year

Table 4-4 Roles and working experience of interviewees

4.6 Data Analysis Methods

In the current study, the collected data was derived from two phases: the quantitative research with an online questionnaire and the follow up qualitative phase with the execution of semi-structured interviews.

For the analysis of the data gathered from the online questionnaire, at first the researcher used the Statistical Package for Social Sciences (SPSS) 20 in order to perform the preliminary examination of the data, such as detect any missing data and outliers and also check for the normality, linearity and multicollinearity of the data as well as produce the descriptive statistics and demographics of the sample. Having ensured that the collected data meets the underlying statistical assumptions, the researcher proceeded to analyse the data through Structural Equation Modeling (SEM) using AMOS in order to test the hypotheses of the proposed theoretical model of the study. In the second phase of data collection of the study, the researcher

used thematic analysis in order to analyse the data collected from ten participants through semi-structured interviews. Both data analysis techniques will be described in more detail below.

4.6.1 Structural Equation Modeling (SEM)

SEM has received a considerable amount of attention from extant studies with researchers from several disciplines adopting it as a statistical analysis tool in order to empirically test their data and thus their hypotheses (Kline, 2005). Structural equation modelling encompasses a number of statistical techniques that allow the investigation of a set of relationships between independent and dependent variables (Tabachnick and Fidell, 2014). According to Hair *et al.*, (2010), SEM seeks to explain the interrelationships among multiple variables similar to multiple regressions analysis of factors. SEM can be considered as the combination of multiple regression analysis and factor analysis, as its foundation lies upon these two statistical techniques. By using SEM, the researcher is adopting a confirmatory, or else hypothesis testing, approach in order to analyse a specific phenomenon. The researcher builds a hypothesized model that is tested with SEM showing whether it is consistent with the collected data thus confirming or rejecting the proposed interrelationships among the variables (Byrne, 2010). SEM is distinguished among similar statistical methods by three unique characteristics: it allows the researcher to estimate multiple interrelated dependence relationships, enables the representation of unobserved concepts as well as allows the researcher to define a model that explains all the sets of relationships in it (Hair *et al.*, 2010).

In the current study, the researcher selected SEM as the most suitable and appropriate technique for the analysis of the data derived from the online questionnaire. According to Tabachnick and Fidell, (2014), when the investigated phenomenon is very complex and multidimensional, the researcher has no other option rather than deploying SEM for the analysis of the data. SEM provides the ability to the researcher to analyse more advanced theoretical models, examine complex phenomena and test sophisticated theoretical models, that basic statistical

methods are not capable to deal with (Schumacker and Lomax, 2004). The proposed model of the current study aims to investigate the effects of mindfulness and IT mindfulness on technostress as well as on job related and ICT related outcomes, rendering it as a rather complex model based on a sophisticated theoretical model. Thus, the adoption of SEM for the analysis of the data was deemed as crucial.

Furthermore, SEM overcomes the limitation of basic statistical methods by allowing the use of both observed and unobserved (latent) variables in the hypothesized model (Schumacker and Lomax, 2004; Byrne, 2010; Hair *et al.*, 2010). The proposed model of the current study, includes six latent unobserved variables, that are measured indirectly through other observed variables or else called indicators. Latent variables are used when a theoretical concept is rather complex and has many meanings and dimensions. By representing a complex theoretical concept with multiple measures, the researcher reduces the measurement error of the concept as well as improves the statistical estimation of the relationships among the various variables (Hair *et al.*, 2010). As a result, in the current study six variables were modelled as latent constructs as they were considered as rather complex concepts that cannot be measured directly and are inferred by responses to certain indicators. Following also previous studies having investigated these concepts (Tarafdar, Tu and Ragu-Nathan, 2010), the researcher deemed that SEM was essential in order to test the proposed model and the proposed hypotheses.

Moreover, SEM allows the testing of a series of interrelated dependence relationships that is not feasible with other statistical methods. In more detail, SEM allows the testing of a model that includes a variable that is dependent on one relationship but becomes independent in a subsequent relationship (Hair *et al.*, 2010). Also, while other statistical techniques only allow for a single relationship between an independent and a dependent variable, many of the same variables affecting each one of the dependent variables, SEM enables the researcher to test multiple relationships simultaneously and more importantly to evaluate the model as a whole (Kline, 2005; Byrne, 2010; Hair *et al.*, 2010). The proposed model of the current study includes the variable technostress which acts as an independent variable, in the relationships with end user satisfaction and end user performance,

but becomes a dependent variable in the relationships with mindfulness and IT mindfulness. As a result the deployment of SEM was crucial for the testing of the proposed hypotheses as well as for the evaluation of the entire model.

SEM can be performed via two distinct statistical techniques: 1) covariance analysis or else called Covariance-based SEM (CB-SEM) using statistical software such as AMOS and LISREL and 2) Partial Least Squares (PLS-SEM) (Gefen, Straub and Boudreau, 2000). The techniques differ in their objectives as well as the underlying statistical assumptions they are based on. While PLS-SEM is deemed as more suitable in a research where the objective is prediction and theory development, CB-SEM has an overall objective of theory testing and is best suited for confirmatory research (Gefen, Straub and Boudreau, 2000). For the current study, Covariance based SEM using AMOS was deemed as the most appropriate technique in order to perform data analysis as the objective of the research is rather confirmatory aiming to test the developed hypotheses of the proposed theoretical model.

In the current study, we follow the six stages recommended by Hair *et al.*, (2010) in order to perform the CB-SEM analysis of the gathered data. As a result, first the measurement model is defined and tested against data and then the structural model is next. All six stages are described in detail in Chapter 5 of the present thesis.

4.6.2 Thematic Analysis

The current study deployed thematic analysis as the technique for the analysis of the data collected from the semi-structured interviews. Thematic analysis has been widely used in academic research in a number of disciplines, such as psychology, sociology, economics and mathematics, aiming to encode qualitative information into explicit 'codes' that describe the collected data as well as interpret the investigated phenomenon (Boyatzis, 1998). It is defined as a process 'for identifying, analysing and reporting patterns within data'(Braun and Clarke, 2006, p. 79) that can be used by early researchers as it is rather accessible and relatively easy to understand, learn and use. According to Braun and Clarke, (2006), there are six

phases that a researcher needs to follow for the execution of thematic analysis as shown on Table 4-5 below.

6 Phases of Thematic Analysis	
Phase 1	Familiarize with data
Phase 2	Generate initial codes
Phase 3	Search for themes
Phase 4	Review themes
Phase 5	Define and name themes
Phase 6	Produce analysis

Table 4-5 Steps of thematic analysis adopted in the current study

At first, the researcher familiarizes herself with the data by transcribing and re-reading the data and then the generation of initial codes, by identifying patterns, across the entire set of data takes place. Next, the researcher starts searching for themes in the data by grouping the previously generated codes in the interviewees' responses. The review of the candidate themes follows accompanied also by their definition and naming. The sixth and last step of thematic analysis encompasses the final analysis, write up and presentation of the results.

In the current study, the researcher followed these six phases (steps) of conducting thematic analysis, as proposed by Braun and Clarke, (2006) grounded on the seminal work of Boyatzis, (1998), as well as followed a theory-driven code development approach by firstly generating some overarching themes from existing literature and previous studies. The detailed description of thematic analysis and results will be presented in Chapter 5.

4.7 Ethical Considerations

In every research project, certain ethical principles should be followed in order to avoid the occurrence of any issues that may arise between the researcher and the

participants of the study. Ethics are used to guide a research project in order to ensure that no harm or adverse consequences will arise from the research activities (Cooper and Schindler, 2009). According to Cooper and Schindler, (2009), the researcher should follow three guidelines which have been adopted in the current study:

- **Explain participants' rights and protection**: The researcher needs to ensure and explain the respondent's rights; The respondent has the right not to participate in the study as participation is totally voluntary as well as the right to withdraw at any time during the research data collection. Furthermore, the researcher should ensure to protect the identity of the respondent as well as the confidentiality of his data. Also, the researcher assured the participants that no participant would be able to be identified in any reports or publications and all the information collected will not be given to any third party and it will be safely stored and secured. In the current study, the researcher undertook all necessary protection measures in order to ensure the anonymity and confidentiality of respondents participating in the online survey as well as the semi-structured interviews. For this reason, the researcher used a separate database for the last question of the online survey that enabled the collection of email addresses of the respondents that were interested to participate in the follow up phase but these responses were not associated with any answers in the main questionnaire. Furthermore, in the second phase of the study the researcher used pseudonyms for the analysis of the interview transcripts.
- **Explain study benefits & obtain informed consent:** The researcher should make sure to explain to the participants the aim and objectives of the study as well as the importance of their participation along with the benefits that the study gains from recruiting the participants. Also, the researcher should obtain informed consent from the participant before any research activities take place. For this reason, before the execution of each interview in the second phase of the study, each of the participants was at first kindly greeted, then the researcher provided a brief introduction of herself; accompanied by a

participant information sheet presenting a brief description of the topic of the study aiming to inform each participant about the nature, aim and objectives as well as purposes of the study. Moreover, the researcher explained the benefits of respondents' participation in the current research study. Then the researcher explained the rights of the participant, as explained above, and asked him to sign an informed consent form stating his agreement to participate in the interview. At last, the researcher asked for the respondent's permission to start the interview. For the quantitative part of the study and the online questionnaire, the researcher provided a participant information sheet, including a brief description of the aim and purposes of the study as well as the rights of the participant, attached in the invitation email that was sent to each of the potentially interested participants.

Furthermore, the researcher ensured to behave with respect to all participants as well as carry out the research activities honourably and responsibly embracing integrity and honesty throughout the entire research journey. Also, the entire data collection process was guided by Brunel University Research Ethics Committee and the researcher obtained an ethical approval before starting the data collection activities. The consent form, participant information sheet and ethical approval are presented in Appendix C .

4.8 Summary

The current chapter provided an analysis of the design and research methods that were implemented in the current study in order to examine the research problem and achieve the study's aim and objectives. The chapter discussed the several different research paradigms that exist in IS research and provided a detailed justification for the selection of the positivist paradigm as the underlying research assumption of the current study. Next, the chapter described the selected strategy of inquiry of the current study, discussing the differences between quantitative and qualitative approaches and justifying the suitability of following a mixed methods approach in

the current study; encompassing a quantitative approach at the first phase of the study and a qualitative approach at the second, complementary, phase of the study. Examining and discussing in detail the reasons for selecting each data collection technique, the chapter presented the data collection procedure of the current study comprised of a survey-based approach and semi-structured interviews. The chapter concluded by presenting the data analysis techniques implemented in the current research, explaining the selection of structural equation modelling for the analysis of quantitative data of the study (N=500) and thematic analysis for the qualitative data gathered from semi-structured interviews.

Chapter 5: Results

5.1 Introduction

In Chapter 3, the proposed conceptual model of the current research was presented along with its hypotheses, independent and dependent variables delineating the effects of mindfulness on technology induced stress and on the outcome strain. In Chapter 4, the research methodology of the current study was described as well as thorough justification for the selection of the survey research approach was provided that will enable us to achieve the research objectives of the present study and thus answer our research question.

This chapter presents first the preliminary data analysis and next the in depth data analysis of the data obtained from the respondents to the online questionnaire. The Statistical Package for Social Sciences (SPSS) version 20 was used in order to perform data screening, deal with missing data, calculate frequencies and percentages as well as perform validity, reliability and exploratory factor analysis. Furthermore, Analysis of Model Structures (AMOS) version 23 was employed in order to run at first the Confirmatory Factor Analysis (CFA) and then proceed to the Structural Equation Modelling in order to test our proposed hypotheses. Next, the chapter presents the thematic analysis of the qualitative data that was gathered through interviews with 10 participants.

5.2 Quantitative data analysis

The following sections present the quantitative analysis of the data collected through an online questionnaire aiming to test the proposed theoretical model of the current and thus the proposed hypotheses.

5.3 Pilot Study Results

Characterized either as a pilot or pre testing, a pilot study is an essential step before administering a self-administered survey in order to detect weaknesses in the design of the questionnaire as well as ensure that the survey functions well as a whole. Therefore, the researcher can refine the survey questions and avoid the occurrence of any fatal flaws in the final questionnaire (Cooper and Schindler, 2009; Zikmund, 2010; Bryman, 2012). Moreover, pilot testing serves as a tool in order to ensure the validity of the questions and the reliability of the data that will be collected (Saunders, Lewis and Thornhill, 2009).

In the present study, it should be noted that all items (questions) used in the current questionnaire were adopted from existing literature that has already established the validity and reliability of the adopted constructs in various contexts and populations. In more detail, the adopted constructs were tested in similar contexts by previous studies thus supporting their applicability for the present study. For the current study, face validity was established by asking the opinion of field experts while content validity and reliability were confirmed by the results of the pilot study analysis that will be described below.

Face validity refers to the subjective agreement of field experts that the instrument used in the questionnaire logically reflects the concept that was intended to be measured (Zikmund, 2010). In order to establish face validity, the researcher asked the opinion of several PhD students and academic staff in the computer science department whether the measures being used seem to be reflecting the concepts of attention (Bryman and Bell, 2011). As a result, face validity was established.

Content validity refers to the degree that the measures a researcher is using in a questionnaire provide adequate coverage of the subject in interest. In order to establish the content validity of the adopted instruments in the current study, the researcher first reviewed thoroughly and carefully the existing literature on each of the adopted concepts in order to ensure their careful definition. Next, the researcher discussed the adopted measures with few field experts, members of academic staff

from Brunel University in order to ensure the representativeness and suitability of the questions for the current research study (Saunders, Lewis and Thornhill, 2009).

The sample size for a pilot study depends on various factors such as the research question, the aim and objectives of the study, the size of the project as well as the available time and budget of the study (Campanelli, 2008; Saunders, Lewis and Thornhill, 2009). It has been highlighted that there have been numerous suggestions in exact literature for the size of the sample of a pilot study, ranging from 10 people to maximum 50 people, with the final decision depending on the researcher and most importantly on the time and money resources available (Campanelli, 2008; Saunders, Lewis and Thornhill, 2009). Saunders et al. (2009) suggest a minimum sample of 10 people that are representative of the targeted population would be sufficient for the pilot study of a smaller-scale questionnaire. For the purposes of the current study, the pilot questionnaire was distributed to 30 PhD students from several disciplines in Brunel University. The sample students represented potential participants of the target population as most of them were also working at the same time while studying for their doctorate degree. From the 30 questionnaires that were distributed, 21 were returned thus indicating a very high response rate (70%). In the last page of the online pilot survey the researcher added a question, that is not part of the main survey, asking for comments and feedback from the respondents regarding the wording, phrasing and clarity of the items included in the survey. Some suggestions and comments were submitted from the respondents which were analysed thoroughly and led to very minor changes mostly on the layout and structure of the questions. For example, most of the respondents could not understand the semantic differential scale that was used to rate the end user satisfaction of an individual. Thus, the researcher revised these items in order to provide more clarity and enhance the understanding of the respondents. As a result, content validity was established.

Reliability refers to the internal consistency of a measure so that all items of an instrument reflect the same underlying construct. The reliability of the constructs of the survey was tested with SPSS version 20 and Cronbach's Alpha (Cronbach, 1951). According to extant literature, alpha value above 0.8 is considered a good

result while alpha above 0.9 is considered as excellent reliability (George and Mallery, 2003). In Table 5-1, the results of Cronbach's alpha are presented where all alpha values are above 0.89 thus confirming that all constructs of the proposed model have very high reliability.

Factor	Items	Cronbach's Alpha
Mindfulness	15	0.923
IT Mindfulness	4	0.920
End user performance	7	0.817
End user satisfaction	4	0.933
Job Satisfaction	3	0.894
Technostress	23	0.915

Table 5-1 Cronbach's a for the pilot study

5.4 Preliminary examination of the main study

According to Hair et al (2006), before proceeding to any multivariate analysis techniques a researcher should ensure that the collected data meets the required underlying theoretical and statistical assumptions. As a result, the aim of our preliminary examination of the collected data, using SPSS and AMOS, was to detect any missing data and outliers as well as check for the normality, linearity and multicollinearity of the data. By ensuring that these assumptions are met, the researcher can then successfully proceed to perform the multivariate analysis and more specifically in our context to employ SEM in order to test the proposed hypotheses.

5.4.1 Data screening and Missing Data

The collected observations (N=500) were screened in order to identify any missing data as all the questions of the online questionnaire were presented as optional to the

respondent aiming to facilitate a positive attitude without forcing him/her to answer to all of the questions. During the case and variable screening process, results showed that missing data was below 2%. Missing data frequencies and percentages are provided in Tables 1 and 2 in Appendix D.

Despite the fact that missing data is a very common problem among researchers performing data analysis, it is crucial to address it effectively as it can have serious implications for the generalizability of results (Hair *et al.*, 2010). Extant literature has suggested a variety of methods that a researcher can use in order to handle missing data. These constitute in the complete case approach (listwise deletion), where all cases with missing data are removed thus the sample size can be drastically reduced, the all-available approach (pairwise deletion), where cases with missing data can still be used, and imputation methods with replacement values where these are calculated through mean substitution, regression imputation or other methods (Hair *et al.*, 2010). According to extant literature, if the missing data is sufficiently low so that it doesn't affect the results, then any of the previously mentioned remedy approaches can be used (Hair *et al.*, 2010; Tabachnick and Fidell, 2014). Studies have suggested that missing data under 10% is considered very low and thus acceptable (Bennett, 2001; Hair *et al.*, 2010). In the current study, the initial data screening revealed that for the collected sample the missing data both for individual cases and variables was less than 2% thus meeting the previously mentioned threshold. Before choosing the best approach for accommodating the missing data in the analysis, it is necessary to ensure the randomness of the missing data so that it doesn't follow any patterns such as concentration in a specific set of questions and attrition at the end of the questionnaire (Hair *et al.*, 2010). Several methods and tests were conducted in order to achieve this aim and confirm that the missing data occurs in a random fashion. At first, the researcher used Little's MCAR test in SPSS 20, in order to test whether the missing data is MCAR (Missing Completely at Random). Little (1988) suggested that when the value of this test is not significant, this might be an indicator of MCAR in the data. In our analysis, the p-value was significant thus the MCAR assumption could not be confirmed. Little's test is not a definite test of MCAR and more importantly it is very sensitive to sample sizes, especially in

samples with more than 500 observations where it results always to be significant. As a result, the researcher had to perform additional tests in order to check that no specific non-random patterns appeared. Visual checking for patterns in the data as well as t-tests were performed, for all important variables with missing data, in order to achieve this aim, where both of these methods confirmed that there were no patterns in the missing data (Little, 1988; Hair *et al.*, 2010). As a result, it could be concluded that the missing data doesn't follow any patterns thus any remedy approach could be employed. The researcher chose the mean substitution method, as there was relatively low level of missing data and there are strong relationships between the variables in order to provide all cases with complete information (Hair *et al.*, 2010). Existing literature suggests that in case of imputation of missing data, SEM analysis should be conducted both with the imputed sample and the listwise sample in order to ensure that results are the same (Tabachnick and Fidell, 2014). The researcher followed this suggestion as it will be discussed in section 5.8. All tests can be found in Tables 3 and 4 in Appendix D.

5.4.2 Outliers

Outliers are observations that are distinctly different from the other observations. Typically, an outlier is a case with an extremely low or high value on one variable, called a univariate outlier, or 'a strange combination of scores on two or more variables that distorts the statistics' referring to a multivariate outlier (Tabachnick and Fidell, 2014, p. 106).

According to Tabachnick and Fidell (2014), a graphical method to detect univariate outliers is to produce boxplots and visually inspect if there are any outlier cases. In the current study, SPSS version 20 was used in order to create boxplots for all variables and visually detect any univariate outliers. Univariate outliers can be found either on dichotomous or continuous variables. In the current study, all variables are ordinal as they follow a Likert scale (1-6 or 1-5) where floor and ceiling values are already included in the scale. Therefore, the researcher couldn't deem any cases as extremes and remove them as the respondents' values reflect the reality. As a result,

no outliers were found to be deleted from the dataset. Results from SPSS on univariate outliers can be found in Figure 1 in Appendix D.

In order to assess multivariate outliers, extant literature suggests the Mahalanobis D^2 measure that evaluates the distance of each case from the centroid of the remaining cases (Kline, 2005; Hair *et al.*, 2010; Tabachnick and Fidell, 2014). In the current study, the calculation of the Mahalanobis distances was conducted with AMOS version 23 and revealed that 73 cases had a p1 value less than 0.05 thus they could be deemed as influential outliers (Tabachnick and Fidell, 2014). Despite the confirmation of the existence of multivariate outliers, the researcher decided their retention in the dataset as the deletion of an outlier on the one hand might improve the multivariate analysis but on the other hand can severely limit the generalizability of the results to the entire population (Hair *et al.*, 2010). Table 5 in Appendix D presents the results of multivariate outliers in AMOS.

5.4.3 Bias

As the current study deployed a survey-based approach using an instrument that included self-reported measures, the researcher ensured to check and control for response bias and especially social desirability bias. Extant literature has defined social desirability bias as 'the tendency on behalf of the subjects to deny socially undesirable traits and to claim socially desirable ones' (Nederhof, 1985, p. 264) as well as the tendency 'to distort self-reports in favourable direction' (Furnham, 1986, p. 385). The current study used self-report measures in order to assess mindfulness and task performance. Regarding mindfulness, several studies have supported the validity of self-report measures for its assessment while evidence on the existence of bias, and especially social desirability bias, that may affect self-report assessment of mindfulness is still scarce and inconsistent. According to extant research, in order to overcome the limitation of using only a scale instrument to measure mindfulness, researchers recommend the use of mixed methods approaches incorporating qualitative investigations (Bergomi, Tschacher and Kupper, 2013; Sauer *et al.*, 2013) complementing surveys in order to capture a more comprehensive understanding of

mindfulness in the workplace (Choi and Leroy, 2015). As a result, for this reason the current study complemented the quantitative phase of the study, that used self-report measures, with a qualitative investigation. Moreover, as suggested by extant literature several remedies were taken in order to control for social desirability bias (Nederhof, 1985; Furnham, 1986): 1) Forced choice items were included in the questionnaire, as respondents were asked to choose one of the five agree/disagree statements that were provided in each question, 2) Neutral questions were included in the questionnaire with regards to social desirability and 3) The survey of the current study was a self-administered questionnaire distributed online to respondents through emails without the intervention of the researcher during the collection of the data. As a result, it can be concluded that the current study ensured for the control of social desirability bias.

Regarding non response bias, the collected sample showed very similar characteristics and attributes with the demographics of the population, such as educational background and daily technology usage. Thus it can be argued that the sample is typical of the population and the present study ensured for the control of non-response bias (Whitehead, Groothuis and Blomquist, 1993). The targeted population in the current study is set as knowledge workers who according to extant literature are characterized as university graduates having received higher level education and obtained academic qualifications. Results from our analysis showed that 80% of the respondents of our sample have obtained either a Bachelor or a Master's degree while 11% have reached a PhD level thus showing that our sample is highly educated reaching the standards of a typical knowledge worker population. Furthermore, according to Brinkley *et al.*, (2009), the core of the knowledge workers are concentrated between the ages of 25-34 and 35-44; Results for our analysis showed that 49,20% of respondents our sample are in the 26-35 age range while 22,40% are in 36-45 group thus revealing that almost 72% of the respondents belong to the 25-45 age category. At last, Brinkley *et al.*, (2009) posit that computerisation has a great impact on knowledge workers who are using computers and general technology at work as mean to assist and enhance their work tasks and processing; in our sample, 97% of the respondents use technology daily for work tasks. As a result,

it becomes apparent that the demographics of our sample render it as very similar to the whole population of knowledge workers thus we can assume that the sample of the current study is typical of a knowledge worker population (Stangor, 2011). Furthermore, another method to test for non-response bias in a set of data is to perform a t-test in SPSS revealing differences in the interested variables. As the current study followed a convenience-based sampling approach, the researcher has no information over the number of non-respondents. Thus, following guidelines from existing literature and previous studies the researcher split the gathered sample into two groups, representing early respondents and late respondents, where the latter act as proxy for non-responses (Fullerton, Kennedy and Widener, 2013; Wallace and Sheetz, 2014). Then, the researcher proceeded into running a t-test in SPSS in order to test for potential differences between the groups. Although the statistical test showed several variables with statistically significant differences between the two groups of respondents, the researcher concluded that the differences are quite small and would not affect the overall interpretation of results. As an example, late respondents were slightly more likely to agree that they are open in learning new ways of using technologies while also were slightly more likely to agree that technology helps towards accomplishing work tasks. Thus, it was concluded that non response bias is not a concern for the present study. Table 6 in Appendix D shows the mean differences between the groups of early and late respondents.

5.4.4 Normality

According to Hair (2006), one of the most fundamental assumptions that need to be met before proceeding to any multivariate analysis is normality. Normality refers to the shape of the data distribution of a variable and its correspondence to normal distribution. A researcher should check both for univariate normality, referring to one variable, and multivariate normality, referring to a combination of two or more variables.

Univariate normality can be checked with statistical methods such as Shapiro-Wilks and Kolmorov-Smirnov tests as well as with graphical methods such as skewness

and kurtosis values of each variable included in the analysis (Hair *et al.*, 2010). In the current study, we conducted both statistical and graphical methods in order to check for univariate normality of the data. At first, we conducted Shapiro-Wilks and Kolmorov-Smirnov tests in SPSS version 20 that revealed that univariate normality cannot be confirmed for all of our variables as p values for these variables were deemed as significant. However, these statistical tests are highly sensitive to sample sizes and the larger the sample, the more likely to give significant results (Ghasemi and Zahediasl, 2012). Therefore, we proceeded to graphical methods in order to visually inspect the distribution of each of the variables as well as check that the values of skewness and kurtosis fall between the accepted thresholds. Skewness refers to the symmetry of the distribution whereas kurtosis refers to the peakedness of a distribution (Tabachnick and Fidell, 2014). We produced histograms for each one of the variables in SPSS version 20 and checked the values of skewness and kurtosis to be between -2 and +2 (George and Mallery, 2003). Regarding skewness, all of the variables had values in the suggested range and regarding kurtosis, four variables seemed to exceed the suggested range values and thus can be deemed as non-normal. According to Hair et al. (2006), although non-normality can significantly affect our results, larger sample sizes above 200 actually reduce the detrimental effects of non-normality. Furthermore, Tabachnick and Fidell (2014) highlight that in large sample sizes (N>200) the impact of departure from zero kurtosis diminishes. Therefore, it was concluded that there was no major issue of non-normality in our data and we decided to retain the above mentioned non-normal variables. Tables 7 and 8 in Appendix D shows the results of normality tests and skewness and kurtosis values for each of the variables.

Univariate normality does not ensure multivariate normality, while the latter can confirm the first. Multivariate normality can be assessed by calculating Mardia's coefficient for multivariate kurtosis. In our analysis, we used AMOS version 23 in order to produce the index of multivariate kurtosis and the critical ratio where values for CR > 5 show deviation from normality (Byrne, 2010). In our case, the CR value was 40 as shown in Table 9 in Appendix D, highly suggesting non-normality in the data thus we should interpret with caution the results of the SEM analysis.

According to Gao et al (2008), in real world datasets there is rarely multivariate normality and thus normal distributions. Furthermore, as already mentioned above, in large sample sizes (N>200) researchers meet very often data that departs from normality. As a result, in our analysis since we have achieved univariate normality, our sample is fairly large (N=500) as well as every indicator in the SEM model is covered by 22 respondents (N=500, indicators=22) we can safely assume that our sample can sufficiently cover the model and multivariate non-normality will not affect the results of our analysis.

5.4.5 Linearity

Another implicit assumption for all multivariate techniques is the linearity of the variables referring to the pattern of the association between each pair of variables in a model (Hair *et al.*, 2010; Tabachnick and Fidell, 2014). Linearity constitutes a prerequisite in order to perform SEM analysis and test the proposed hypotheses as it presumes that there is a straight line relationship between a set of variables. In order to assess the linearity of the variables, we used Regression analysis with curve estimation in SPSS version 20 to check the relationship of every independent and dependent variable included in our model. The analysis revealed that all relationships between the independent and dependent variables of the proposed model are sufficiently linear. Tables 10-17 in Appendix D show the results of the regression tests for the relationships between the variables.

5.4.6 Multicollinearity

Multicollinearity refers to the extent that a variable can be explained by other variables in the analysis and occurs when two or more variables are too highly correlated (Hair *et al.*, 2010; Tabachnick and Fidell, 2014). It is very important before proceeding to any statistical analysis, that the data is screened for multicollinearity as it can cause statistical instability. According to extant literature,

correlation values above 0,7 should create concerns to researchers for the existence of possible multicollinearity problems (Tabachnick and Fidell, 2014). In order to check for multicollinearity issues, tolerance values should be more than 0.10 and the Variable Inflation Factor (VIF) should be below 3 (Pallant, 2010). After testing for multicollinearity in SPSS 20 by conducting a linear regression, the results showed that all tolerance values are above 0.10 and VIF below 3 thus revealing that multicollinearity does not exist in our dataset. Tables 18-21 in Appendix D show the results of SPSS analysis.

5.4.7 Homoscedasticity

Homoscedasticity constitutes an additional assumption that should be met in order to be able to proceed to any multivariate analysis. Homoscedasticity refers to 'the assumption that dependent variables exhibit equal levels of variance across the range of predictor variables' (Hair *et al.*, 2010, p. 83). As a result, the researcher should ensure that the variance of the dependent variable is distributed across the range of values of the predictor variable. In order to check for the homoscedasticity of data, Hair et al. (2006) suggest to conduct the Levene's test in order to test whether the variances of one variable are equal across any number of groups. In our analysis, we conducted Levene's test which can be found in Table 22 in the Appendix D.

5.5 Reliability

Similar to the pilot study, the reliability of the constructs of the current study was checked in order to determine the consistency of their measures. Reliability refers to the internal consistency of a measure (Bryman, 2012) so that all 'instrument items are homogenous and reflect the same underlying construct(s)' (Cooper and Schindler, 2009, p. 260). Reliability is usually checked with Cronbach alpha where values above 0,7 are considered acceptable, above 0,80 good and values above 0,9

are considered excellent (George and Mallery, 2003). In other words, as the value of Cronbach alpha for each construct gets closer to 1, it reaches better reliability. In our analysis, all constructs had Cronbach's a values above 0,8 showing that their internal consistency was validated (Table 23 in Appendix D).

Furthermore, in order to ensure the reliability of each measure the researcher performed Exploratory Factor Analysis (EFA) in SPSS version 20 in order to check the unidimensionality of each construct. As expected, results indicated that there is only one eigenvalue above 1 for each construct meaning that each group of indicators belong to one only latent construct. Tables 24-41 in Appendix D show results of SPSS on reliability tests.

5.6 Demographics

The target sample for the online questionnaire survey of the current study was set as full-time or part-time working individuals in the UK that use technology during their day-to-day work tasks. An invitation email, describing the aim of the online survey as well as the rights of the respondents, was sent to 100 working individuals who were asked to forward it to additional potential interested respondents. Overall, we collected 500 questionnaires for data analysis. The results of the demographic analysis follow below.

Regarding the gender of the respondents, male participants were 52% and female participants were 48% revealing that the proportion of each gender in the sample was almost equally distributed. Therefore, it can be concluded that gender will have no effect on our results but will rather strengthen their validity and generalizability. Table 5-2 shows the frequencies and percentages of the gender of the respondents.

	Frequency	Percent
Male	262	52,40%
Female	238	47,60%

Table 5-2 Gender

Furthermore, regarding the age of our sample, the majority of the respondents (49.20%) were among 26-35 years old while 22,4% belonged to the 36-45 age group. As a result, almost 80% of our sample belonged to ages below 45 years old. The analysis of the age of the respondents is shown in Table 5-3.

	Frequency	Percent
<26	53	10,60%
26-35	246	49,20%
36-45	112	22,40%
46-55	59	11,80%
56-65	26	5,20%
over 65	4	8,0%

Table 5-3 Age

Regarding the highest educational qualification achieved, the majority of the respondents (80%) had undertaken some form of higher education, either a Master's degree (40,4%) or a Bachelor's degree (39,6%), while 11% of the respondents have reached a PhD level. Table 5-4 presents the frequencies and percentages of the educational background of the respondents.

	Frequency	Percent
High school	11	2,20%
Two year college	25	5%
Bachelor's	202	40,40%
Master's	198	39,60%
PhD	55	11%
Other	9	1,80%

Table 5-4 Education

In terms of working experience, 31,4% of the respondents have worked totally in their life 6-10 years while 25,6% have worked 1 to 5 years and 24,20% over 16 years in their lives. In contrast, the majority of the respondents (57,2%) have been working in their current organization for 1-5 years while 27,4% of them have been working there for 6-10 years. As a result, it becomes apparent that while total work

experience is almost equally divided among the year categories, regarding current work experience almost 70% of the respondents have been working in their current job for up to 10 years. Tables 5-5 and 5-6 present the results of the analysis regarding total and current work experience.

	Frequency	Percent
1-5	128	25,60%
6-10	157	31,40%
11-15	94	18,80%
16 and over	121	24,20%

Table 5-5 Total work experience

	Frequency	Percent
1-5	286	57,20%
6-10	137	27,40%
11-15	51	10,20%
16 and over	26	5,20%

Table 5-6 Current work experience

Regarding the daily usage technology, results revealed that the strong majority of the respondents (83%) are using technology more than 6 hours per day for their work tasks while 14,6% are spending 3-6 hours with IT tasks at work and only 3% of them less than 3 hours per day. Table 5-7 depicts the frequencies and percentages of daily IT usage.

	Frequency	Percent
less than 3 hours	15	3%
3-6 hours	73	14,60%
> 6 hours	412	82,40%

Table 5-7 Daily IT usage

5.7 Descriptive Statistics

This section presents the descriptive statistics and more specifically the means and standard deviations of all constructs used in the proposed model of the current study. As mentioned in chapter 3, the independent and dependent variables of our conceptual model constitute in mindfulness, IT mindfulness, job satisfaction, end user satisfaction and end user performance. Overall, all means, except the mean for the technostress construct, were greater than 3.73 showing that participants expressed positive responses to the items of the measured constructs of the online survey.

5.7.1 Mindfulness

The main construct of the current research, mindfulness, was adopted from Brown and Ryan (2003) and was measured with 15 questions on a 6-point Likert scale ranging from 1=almost always to 6=almost never. According to Brown and Ryan (2003), the assessment of individual mindfulness of each respondent can be revealed by calculating the mean score of the answers given to the 15 items. More specifically, higher scores indicate higher levels of mindfulness while lower scores reflect lower levels of mindfulness. Our analysis, depicted in Table 5-8, revealed that mean scores range between 3.14 (±1.25) and 4.86 (±1.21) with overall mean score for all 15 items being 4.05 (±0.65). As a result, the analysis indicated that all mindfulness items were highly rated from the majority of the respondents as the overall mean for all items was above the neutral point (3). Overall, it can be concluded that the majority of the respondents in our sample can be characterized as having medium to high levels of mindfulness.

	Mean	Std. Deviation
M1	4.60	1.12
M2	4.69	0.98
M3	4.02	1.13
M4	3.72	1.25
M5	4.14	1.18
M6	3.14	1.25
M7	4.01	1.16
M8	4.12	1.12
M9	4.26	1.22
M10	4.20	1.13
M11	3.18	1.17
M12	4.56	1.21
M13	3.18	1.18
M14	4.04	1.17
M15	4.86	1.21

Table 5-8 Mindfulness

5.7.2 IT Mindfulness

Respondents were asked to indicate their agreement to four items that measured IT mindfulness. The measure was adopted from (Thatcher *et al.*, forthcoming) including a 5-point Likert scale where 1=Strongly Disagree and 5=Strongly Agree. The results of the analysis are reported in Table 5-9 where means range from 3.59 (±0.88) to 4.09 (±0.89). The average mean (3.9) indicates that all respondents moderately agreed with the items of IT mindfulness and the average standard deviation (0.89) shows that responses have a very small dispersion around the mean. Overall, the majority of the respondents can be characterized as moderately IT mindful when they use ICTs in order to complete their daily work tasks.

	Mean	Std. Deviation
Alertness to Distinction (AD)	3.59	0.88
Openness to Novelty (ON)	4.09	0.89
Awareness of Multiple Perspectives (MP)	4.21	0.77
Orientation in the Present (OP)	4.00	0.83

Table 5-9 IT Mindfulness

5.7.3 End user performance

End user performance, consisting of ICT-enabled productivity and ICT-enabled innovation, was measured by seven items with a 5-point Likert scale adopted from Tarafdar et al. (2010). Table 5-10 presents the results of our analysis with means ranging between 3.71(±0.85) and 4.54 (±0.68) and an overall mean of 4.10 (±0.68). Results indicate that the majority of the respondents agree with the fact that technology improves an individual's productivity and innovation when utilized for the execution of daily work tasks and processes.

	Mean	Std. Deviation
PR1	4.17	0.60
PR2	4.27	0.72
PR3	4.54	0.68
PR4	4.28	0.68
INN1	3.87	0.83
INN2	3.86	0.84
INN3	3.71	0.85

Table 5-10 End user performance

5.7.4 End user satisfaction

End user satisfaction was assessed with four items and a 5-point semantic differential scale adopted from Bhattacherjee (2001). The semantic differential scale

rated the perceived satisfaction, pleasure, content and delight of the respondent regarding his use of ICTs and the connection with his work tasks. Furthermore, each semantic scale ranged from negative to positive feeling for example 1=dissatisfied and 5=satisfied. The results of the analysis, reported in Table 5-11, showed that the lowest mean score was 3.44 (±0.59) and the highest 3.93 (±0.69). The average standard deviation shows that there is very little dispersion on the opinions of respondents. Overall, the majority of the participants seem to feel moderately satisfied and somewhat pleased with their use of technology for their daily work tasks as well as with the extent that utilized ICTs contribute to the successful execution of their work tasks.

	Mean	Std. Deviation
ES1	3.93	0.69
ES2	3.75	0.67
ES3	3.76	0.75
ES4	3.44	0.59

Table 5-11 End user satisfaction

5.7.5 Job Satisfaction

Job satisfaction was assessed by using a measure with three questions with a 5-point Likert scale (1=Strongly Disagree, 5=Strongly Agree). Table 5-12 presents the descriptive statistics of our analysis where means ranged from 3.73 (±0.77) to 3.97(±0.90) and the mean score of the three items was 3.73 (±0.85) indicating that the sample moderately agrees with the measured variables. Overall, results suggest that the majority of the respondents feel satisfied with their existing job as well as contented to be working in the current organization and position.

	Mean	Std. Deviation
JS1	3.73	0.77
JS3	3.90	0.85
JS2r	3.97	0.90

Table 5-12 Job Satisfaction

5.7.6 Technostress creators

The technostress creators construct was measured with a 23-item instrument on a 5-point Likert scale adopted from Tarafdar et al. (2007) where 1=Strongly Disagree and 5=Strongly Agree. The 23 items represent the five technostress creators known as techno overload, techno invasion, techno complexity, techno insecurity and techno uncertainty that all five together comprise the technostress construct. The results of the descriptive analysis are reported in Tables 5-13 – Table 5-17 for each one of the stressors.

Regarding techno overload, mean scores ranged between 2.90 (±0.87) and 3.64 (±1.10) with average mean 3.29 (±0.98) indicating that the majority of the participants moderately agree on the fact that multitasking and information overload can create overwhelming as well as unsettling feelings on individuals within organizational settings.

	Mean	Std. Deviation
OV1	3.00	0.98
OV2	2.90	0.87
OV3	3.64	1.10
OV4	3.53	0.94
OV5	3.40	1.00

Table 5-13 Overload

For the next stressor, techno invasion, mean scores ranged between 2.28 (±1.15) and 3.15 (±1.04) with an average mean 2.65 (±1.04). Results, in Table 5-14, indicate the

moderate disagreement of the respondents on the measured stressor and more specifically on the items capturing the notion that today's organizational ICTs have created blurred boundaries between the personal life and the working life of an individual.

	Mean	Std. Deviation
INV1	2.59	1.02
INV2	3.15	1.04
INV3	2.60	0.96
INV4	2.28	1.15

Table 5-14 Invasion

In addition, in Table 5-15 the analysis on techno insecurity is reported where mean scores ranged between 1.95 (±0.83) and 3.16 (±0.92) and the overall average mean is 2.50 (±0.91). Results reveal that the majority of the respondents moderately disagree with the measured items stating that individuals experience feelings of insecurity and fear of losing their job either to new technologies or other people who are more IT oriented.

	Mean	Std. Deviation
INS1	2.36	0.86
INS2	3.16	0.92
INS3	2.52	0.94
INS4	1.95	0.83
INS5	2.53	0.99

Table 5-15 Insecurity

For the next stressor, techno complexity, Table 5-16 shows that means range between 1.96 (±0.96) and 3.34 (±1.02) with an average mean 2.40 (±0.97) indicating moderate disagreement of the majority of the respondents with the measured items of this stressor. Results reveal that the majority of the respondents moderately disagree with the items capturing the notion that the complexity of organizational

ICTs forces individuals to spend more time and effort towards understanding new technologies thus creating unsettling feelings to them.

	Mean	Std. Deviation
CO1	2.06	0.98
CO2	1.96	0.96
CO3	3.34	1.02
CO4	2.67	0.93
CO5	1.97	0.94

Table 5-16 Complexity

Regarding techno uncertainty, results in Table 5-17 show mean ranges between 2.92 (±0.87) and 3.51 (±0.79) with average mean 3.25 (±0.83), indicating that the majority of respondents moderately agree on the idea that continuing software and hardware changes as well as upgrades create stressing conditions for individuals at work.

	Mean	Std. Deviation
UN1	3.51	0.79
UN2	3.42	0.82
UN3	2.92	0.87
UN4	3.13	0.85

Table 5-17 Uncertainty

Overall, the mean of all five technostress creators is 2.82 (±0.95) revealing moderate disagreement of the sample on the technostress creators construct. This reveals that the majority of the respondents do not recognize the specific suggested combination of the previously mentioned technostress stressors as factors that can create unsettling and stressing conditions while utilizing ICTs for work tasks within organizational settings.

5.8 Structural Equation Modeling Results

In the previous sections we described all the preliminary tests and analysis required to proceed to the multivariate data analysis. The current section presents the in depth analysis of the gathered data of the present study using Structural Equation Modeling with AMOS version 23. Two steps were followed in the data analysis process. First, the measurement model was specified in order to assess the fit of the data on the theoretical model and then the reliability and validity of the constructs was examined. Next, after the validation of the measurement model the researcher specified the structural model in order to test the proposed Hypotheses with the independent and dependent variables of the proposed conceptual model.

5.8.1 Verification of Second-order Constructs

Before proceeding to the measurement model specification, we verified the existence of the second-order models for technostress creators and end user performance constructs. According to Tarafdar et al. (2010), when the t-coefficient or else the ratio of the chi squares of the first order model and the second-order model is above 0.8 then the second-order model is validated. By conducting our analysis in AMOS version 23, results showed that for the technostress creators construct the chi square of the first order model was 1030 while for the second-order model this value was 1112. As a result, the t-coefficient, ratio of the two models, (1030/1112= 0.96) exceeds the required threshold thus indicating the existence of a second-order model for the technostress creators construct. In the case of the end user performance construct, we could not calculate the chi square of the second-order model as it consists from only two sub-indicators. According to Tarafdar et al. (2010), in this case the researcher can check the significance of the second order coefficients in the CFA model. In our CFA analysis, the second-order coefficients were found to be significant at the 0.001 level thus verifying the presence of the second-order model for the end user performance construct. Having validated the second-order models,

the averages of the first order sub constructs were considered as indicators to the first order models for technostress creators and end user performance latent variables.

5.8.2 Item parcelling

The researcher ran several CFA models in order to assess the fit of the gathered data on the conceptual model. The majority of previous studies that have employed the Mindfulness (MAAS) instrument, consisting of 15 items, have created item parcels in order to reduce the number of the items as well as the complexity of the model and also increase the standardized weights of the mindfulness items (Little and Cunningham, 2002; Coffey and Hartman, 2008; Kiken and Shook, 2012; Pearson *et al.*, 2015). Following previous studies (Little and Cunningham, 2002; Pearson *et al.*, 2015), the researcher first conducted Exploratory Factor Analysis (EFA) using Maximum Likelihood and extraction of the only factor and then created three parcels by combining the items with the highest loadings with the items with the lowest ones. The first parcel (MAAS1) items were M7, M2, M10, M15 and M8, while the second parcel (MAAS2) included M14, M6, M4, M3 and M12 and the third parcel (MAAS3) included items M5, M11, M9, M13 and M1. Table 5-18 presents the loading of each indicator before the development of the parcels.

Item	Loading
M1	0.45
M2	0.31
M3	0.42
M4	0.53
M5	0.49
M6	0.38
M7	0.75
M8	0.72
M9	0.42
M10	0.74
M11	0.45
M12	0.53
M13	0.44
M14	0.72
M15	0.32

Table 5-18 Mindfulness Item Loadings

5.8.3 Measurement Model Specification (CFA): Goodness of Fit

Having verified the existence of second-order models and created parcels for the mindfulness construct, the first step of the multivariate data analysis includes the execution of Confirmatory Factor Analysis (CFA) in order to assess the fit of the data in the theoretical model and the goodness of the fit indices as well as checking for the reliability and validity of the constructs. Figure 5-1 shows the measurement model in AMOS where latent variables are represented with ovals shapes and indicators (items) are depicted with rectangle shapes.

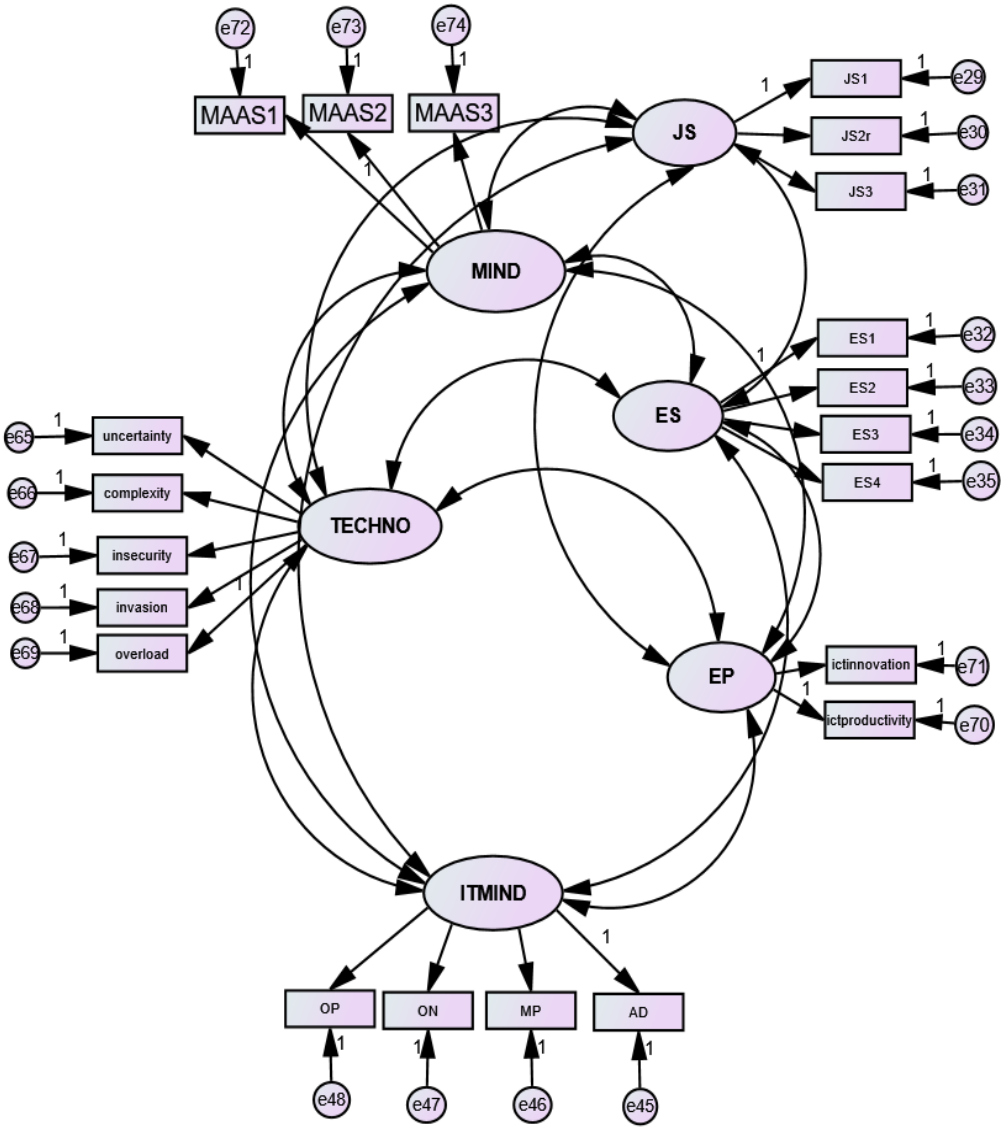

Figure 5-1 Hypothesized CFA Measurement Model

In order to assess the model validity, the researcher should ensure the goodness of fit between the hypothesized model and the collected data (Byrne, 2010; Hair *et al.*, 2010). There are three types of Goodness of Fit Measures (GOF): Absolute Fit Measures, describing how well the estimated model represents the sample data or how well the theory fits the data, Incremental Fit Measures, indicating how well the estimated model differs from an alternative baseline model, and Parsimony Fit Measures, indicating whether the specified model is parsimonious considering its fit relating to its complexity.

The most fundamental absolute fit index is the x^2 statistic that shows the discrepancy between the sample and fitted covariance matrices. However, x^2 is very sensitive to sample sizes as well as to the number of indicators in the model, where in large sample sizes (>400) and in models with a large number of observed variables the p-value turns out always statistically significant, thus indicating a badness or lack of fit. As a result, Hair et. al (2006) suggest that researchers should avoid using this index as a sole measure and should accompany it with additional alternative fit indices in order to assess the fit of the model. In our first run CFA analysis in AMOS, as shown in Figure 5-2 below, chi square is 570.044 which as a sole measure indicates a poor fit of the model. However, our sample is rather large (N=500) as well as the number of the indicators thus additional fit indices should be checked in order to overcome this problem and assess the fit of the model with the gathered data (Hair et. al 2006).

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	57	570.044	174	.000	3.276
Saturated model	231	.000	0		
Independence model	21	4049.777	210	.000	19.285

Figure 5-2 Chi square value in first CFA run

The Normed chi-square, the ratio of the chi-square to the degrees of freedom (CMIN/DF), has been proposed as a solution to the x^2 problem with values between 2 and 5 considered as acceptable (Salisbury, Chin and Gopal, 2002). In our first run analysis, x^2/df was 3,2 indicating an acceptable fit.

After the first CFA run, results indicated that there was room for further improvements in the initial model in order to achieve better model fit. As a result, in order to ensure the best results in terms of the model fit, reliability, and validity, the researcher decided to perform the following improvements. First, to delete any items with low factor loadings and more specifically, items with factor loadings (standardized regression weights) below 0.5 (Hair et. al 2006). Furthermore, to ensure that the standardized residual covariances do not exceed the value of |4.0|

(Byrne, 2010; Hair *et al.*, 2010). Following these measures, the researcher performed the deletion of techno uncertainty from the second order construct technostress from the initial measurement model as it had a very low factor loading (<0.5). All standardized residual covariances fell below the recommended value.

According to Hair et al. (2006), a researcher should ensure that several alternative Absolute indices such as RMR,GFI and AGFI, Incremental indices such as NFI, RFI, IFI, TLI and CFI and Parsimony indices such as PNFI and RMSEA fall between the suggested thresholds. Table 5-18 presents the results of the first CFA run along with the results of the final (complete) run CFA analysis after the implemented improvements as well as the suggested thresholds for the goodness of fit indices.

Fit Index	Recommended Value	1st CFA	Final CFA
x2	Non-significant at $p < 0.05$	570.04	421.87
x2/df	$5 > x2/df > 2$	3.28	2.74
Goodness of Fit Index (GFI)	> 0.90	0.900	0.915
Adjusted Goodness of fit Index (AGFI)	> 0.80	0.867	0.884
Root Mean Square Residual (RMR)	the smaller the better, 0 is considered as perfect fit	0.040	0.031
Normed Fit Index (NFI)	> 0.90	0.859	0.893
Relative Fit Index (RFI)	> 0.90	0.830	0.868
Incremental Index of Fit (IFI)	> 0.90	0.898	0.929
Tucker Lewis Index (TLI)	> 0.90	0.876	0.912
Comparative Fit Index (CFI)	> 0.90	0.867	0.929
Root Mean Square Approximation (RMSEA)	< 0.08	0.068	0.059
Parsimony Normed Fit Index (PNFI)	> 0.06	0.712	0.724

Table 5-19 Fit Indices in CFA

Results of the final CFA run showed that fit indices values fall between the suggested thresholds thus indicating the achievement of a good measurement model. Figure 5-3 shows the final measurement model in AMOS after revisions were made. As a result, the researcher can successfully proceed to the assessment of the construct validity of the model.

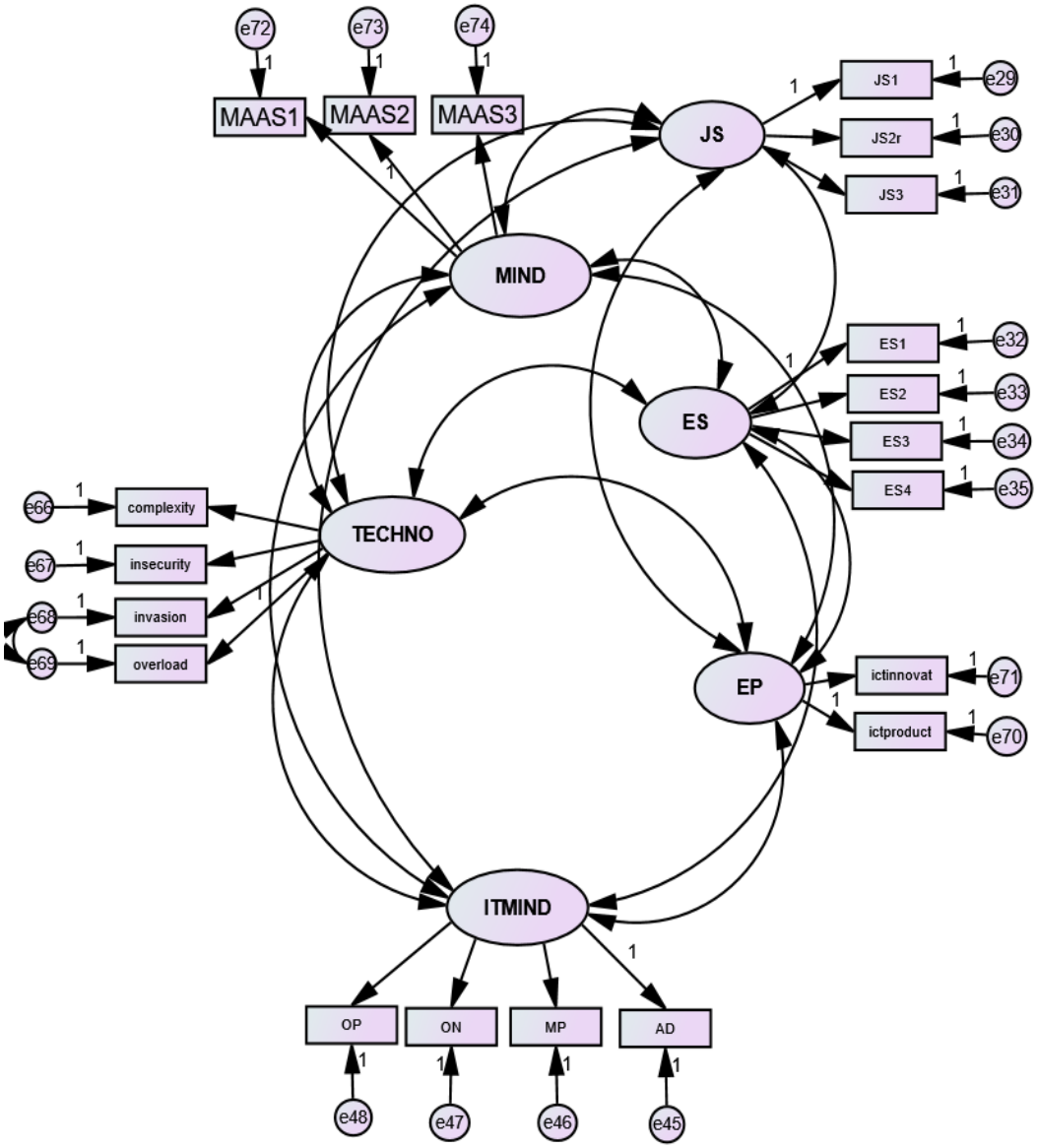

Figure 5-3 Final refined measurement model

5.8.4 Measurement Model Specification (CFA): Construct Validity

A significant advantage of the CFA analysis is the fact that provides the researcher the ability to assess the construct validity of the deployed measurement constructs. Construct validity refers to the extent that a set of measured items reliably measure and truthfully reflect the theoretical latent construct (Zikmund, 2010). Construct validity consists of several components such as face validity, convergent validity, discriminant validity and nomological validity.

As previously mentioned, face validity, 'the extent to which the content of the items is consistent with construct definition' (Hair *et al.*, 2010, p. 662) according to the researcher's judgement, was validated by the results of our pilot study and the received feedback from the respondents of the pilot study.

Convergent validity refers to 'the extent to which indicators of a specific construct converge or share high proportion variance in common' (Hair *et al.*, 2010, p. 662). There are three methods that a researcher can assess the convergent validity of the constructs. At first, in our CFA model, we checked that the standardized weights of all indicators were above 0.05 (b>0.5) indicating that each item loads adequately on the latent construct. As already mentioned before, for the case of technostress creators, the researcher decided to perform the deletion of the uncertainty item as it showed a very low loading (0.147). Secondly, in order to ensure the convergent validity of the model the Average Variance Extracted (AVE) was calculated for each construct. As AMOS cannot calculate these values, AVE was computed as the ratio of the sum of the square standardized factor loadings to the number of the items as shown in the formula below.

$$\mathrm{VE} = \frac{\sum_{i=1}^{n} {\lambda_i}^2}{n}$$

where λ is the standardized regression weights and n represents the items.

According to Hair et al. (2006), AVE should be above 0.5 to suggest adequate convergent validity. In our analysis, as shown in Table 5-20, the total AVE of all

five constructs was 52,34% (0,52) while all AVE values for individual constructs were above 0,5 (50%) except for the technostress creators construct. For this construct, although the AVE value was below 0,5 (0,31), the researcher decided its retention due to its high importance and contribution to the proposed theoretical model of the study. The third method to assess the convergent validity of the constructs of a model is the Composite Reliability (CR) of each construct computed from the ratio of the sum of the squared factor loadings to the sum of the error variance. Extant literature suggests that CR should be greater than 0.6 and preferably above 0.7 (Hair *et al.*, 2010). In our analysis, as shown in Table 5-20, all CR values area above 0.6 and most of them above 0.7 thus indicating that convergent validity is established.

	AVE	**CR**
IT mindfulness (ITMD)	0.60	0.86
Technostress (TECHNO)	0.31	0.64
End user performance (EP)	0.51	0.67
End user satisfaction (ES)	0.49	0.79
Job Satisfaction (JS)	0.57	0.80
Mindfulness (MD)	0.65	0.94

Table 5-20 Convergent Validity

Discriminant validity refers to the extent that a construct is unique and distinct from others constructs (Hair *et al.*, 2010; Zikmund, 2010) and can be assessed by checking that all AVE values are larger than the corresponding Squared Inter-construct Correlations (SIC), the correlations computed by AMOS. As seen in the Table 5-21 below, our analysis indicated that discriminant validity is established as all AVE values are larger than the relative SIC. In the case of the end user performance construct, although it is shown that the SIC value for IT mindfulness (55,95%) is higher than the VE of EP (50,79%), we consider it as acceptable as the SIC value only slightly exceeds the relevant VE value.

	VE	ES	EP	ITMD	TECHNO	JS	MD
ES	49.24%		44.80%	26.63%	13.99%	16.48%	2.89%
EP	50.79%	44.80%		55.95%	15.29%	11.16%	7.02%
ITMD	60.23%	26.63%	55.95%		17.72%	5.62%	3.61%
TECHNO	31.30%	13.99%	15.29%	17.72%		15.29%	5.66%
JS	57.20%	16.48%	11.16%	5.62%	15.29%		4.58%
MD	65.29%	2.89%	7.02%	3.61%	5.66%	4.58%	

Table 5-21 Discriminant Validity

Nomological validity, that examines whether the correlations of the constructs in the measurement theory make sense, can be tested by ensuring that all covariances between the independent and dependent variables of the CFA model have significant correlations (Hair *et al.*, 2010). In our CFA analysis, as depicted in Figure 5-4 below, all covariances have significant p values thus indicating that nomological validity is established. Overall, in our CFA analysis face validity, convergent validity, discriminant validity and nomological validity were achieved thus indicating that construct validity was established.

Furthermore, an additional requirement in a CFA analysis is the Common method bias (CMB) test which checks for any bias that has affected the dataset due to external conditions other than the measures. CMB in our dataset was checked with Harman's single factor test in SPSS (Podsakoff *et al.*, 2003), where Exploratory Factor Analysis (EFA) results showed that the single factor results for less than 50% of the total variance. As a result, it was indicated that there is no common method bias in our data. Table 42 in Appendix D depicts the results of the Harman's single factor test.

			Estimate	S.E.	C.R.	P
Job satisfaction	<-->	End user satisfaction	.111	.018	6.351	***
technostress	<-->	mindfulness	-.024	.008	-2.949	.003
End user satisfaction	<-->	technostress	-.035	.009	-3.772	***
IT mindfulness	<-->	technostress	-.061	.015	-3.982	***
technostress	<-->	End user performance	-.031	.008	-3.800	***
Job satisfaction	<-->	mindfulness	.080	.021	3.819	***
End user satisfaction	<-->	mindfulness	.049	.016	3.083	.002
IT mindfulness	<-->	mindfulness	.079	.022	3.533	***
End user performance	<-->	mindfulness	.061	.014	4.285	***
Job satisfaction	<-->	IT mindfulness	.094	.022	4.225	***
Job satisfaction	<-->	End user performance	.074	.014	5.097	***
End user satisfaction	<-->	IT mindfulness	.157	.020	7.696	***
End user satisfaction	<-->	End user performance	.113	.014	8.136	***
IT mindfulness	<-->	End user performance	.183	.020	9.220	***
Job satisfaction	<-->	technostress	-.035	.010	-3.499	***

Figure 5-4 Covariance table and p values from AMOS

5.8.5 Structural model and Hypotheses testing

Having established a good measurement model as well as construct validity for our sample, we can proceed to the structural model and the testing of the proposed hypotheses.

In contrast with the CFA model where there is no need to differentiate between dependent and independent variables, the structural model depicts causal relationships with one headed arrows pointed from the independent to the dependent variables. Furthermore, the structural model depicts the covariances between the independent variables with two-headed arrows. The results of the structural model

analysis are discussed below. Figure 5-5 below shows the structural model in AMOS.

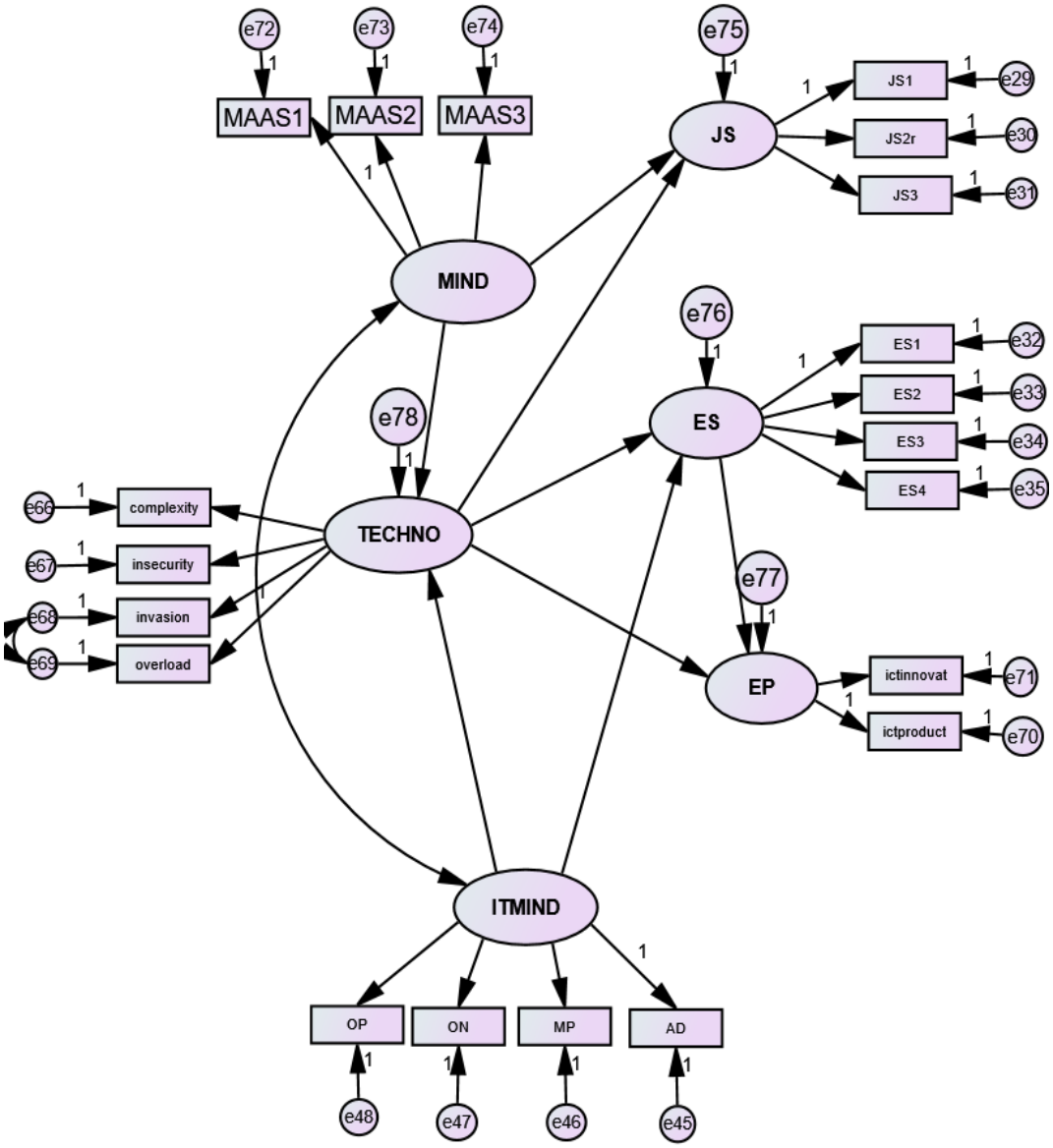

Figure 5-5 Structural Model

Based on the same criteria as the ones we implemented for the CFA model, the results of the fit indices of the first run of the structural model indicated a good fit of the model. As the dependent variables of the proposed model can be influenced by other factors than those in the proposed model (Srivastava, Chandra and Shirish, 2015), at this point the researcher decided to introduce control variables in the

structural model. We included two different types of controls variables in the model which constitute in: 1) demographics: gender, age and education and 2) extent of IT usage measured in hours: daily IT usage at work.

Extant research has shown that age, gender, educational background (Wang, Shu and Tu, 2008) and extent of IT usage at work (Ayyagari, Grover and Purvis, 2011; Maier, Laumer and Eckhardt, 2015) can influence the levels of stress that individuals experience due to ICTs as well as the satisfaction with ICTs (Fuglseth and Sørebø, 2014) while ICT-enabled performance can be influenced by educational levels (Tarafdar, Pullins and Ragu-Nathan, 2015).

Results from the SEM analysis including the control variables showed that none of them had a significant effect on the dependent variables of the model, namely technostress, end user satisfaction and end user performance, thus the researcher performed the deletion of the control variables from the structural model. Figure 5-6 shows the regression weights of the control variables and the p-values revealing that none of the control variables had a significant effect on the dependent variables of the structural model.

			Estimate	S.E.	C.R.	P
Technostress	<---	Gender	0.23	0.017	1.341	0.18
	<---	Age	0.008	0.008	1.029	0.303
	<---	Education	0.001	0.009	0.105	0.916
	<---	Itusage	-0.032	0.019	-1.646	0.101
Endusersatisfaction	<---	Gender	-0.056	0.041	-1.373	0.17
	<---	Age	-0.018	0.019	-0.926	0.354
	<---	Education	0.036	0.022	1.638	0.101
	<---	Itusage	-0.07	0.044	-1.598	0.11
Enduserperformance	<---	Gender	-0.013	0.036	-0.356	0.722
	<---	Education	-0.005	0.019	-0.263	0.793

Figure 5-6 Control Variable Estimates

As a result, the researcher proceeded to run the structural model with the deletion of the control variables. Table 5-22 shows the suggested thresholds for the goodness of fit indices along with the results of the final (complete) run analysis, after the introduction and deletion of the control variables.

Fit Index	Recommended Value	Structural model
x2	Non-significant at p < 0.05	514.61
x2/df	5 > x2/df >2	3.22
Goodness of Fit Index (GFI)	> 0.90	0.902
Adjusted Goodness of fit Index (AGFI)	> 0.80	0.871
Root Mean Square Residual (RMR)	the smaller the better, 0 is considered as perfect fit	0.040
Normed Fit Index (NFI)	> 0.90	0.870
Relative Fit Index (RFI)	> 0.90	0.845
Incremental Index of Fit (IFI)	> 0.90	0.906
Tucker Lewis Index (TLI)	> 0.90	0.888
Comparative Fit Index (CFI)	> 0.90	0.906
Root Mean Square Approximation (RMSEA)	< 0.08	0.067
Parsimony Normed Fit Index (PNFI)	> 0.06	0.732

Table 5-22 Fit indices for structural model

Results showed that all fit indices fall between the suggested thresholds thus indicating a good model fit. Table 5-23 depicts the path coefficients for the proposed hypotheses relationships of the model.

Hypothesis	Path Coefficient	Result
H1: Technostress creators negatively influence job satisfaction	-0.387***	**Supported**
H2: Technostress creators negatively influence end user satisfaction	-0.238***	**Supported**
H3: Technostress creators negatively influence end user performance	-0.353***	**Supported**
H4: End user satisfaction positively influences end user performance	0.539***	**Supported**
H5: Mindfulness is positively related to job satisfaction	0.110**	**Supported**
H6: Mindfulness negatively influences technostress creators	-0.166***	**Supported**
H7: IT Mindfulness is positively related to end user satisfaction	0.414***	**Supported**
H8: IT Mindfulness negatively influences technostress creators	-0.547***	**Supported**
Note: *p<0.1, **p<0.05, ***p<0.01, NS p>0.1		

Table 5-23 Summary of results for Hypotheses

As can be shown in Table 5-23, results supported all of our proposed hypotheses. More specifically, it was predicted that technostress stressors decrease an individual's job satisfaction (H1). The path between technostress creators and job satisfaction was significant and negative (b=-387, $p < 0.001$) thus H1 was confirmed. Furthermore, it was predicted in Hypothesis 2 (H2) that people experiencing higher levels of technostress will be more likely to have lower satisfaction from ICT applications they are using in order to complete their work tasks. A significant negative correlation between technostress Creators and End User Satisfaction was observed (b=-.238, p=0.007). As a result, H2 is supported. In addition, it was predicted that technostress negatively affects a user's performance while using ICT applications (H3). As expected, a significant negative relationship was found between technostress creators and end user performance thus confirming H3 (b=-.353, $p <0.001$). Moreover, hypothesis 4 indicated that an employee's user satisfaction can positively influence his user performance within organizational

settings. The path between end user satisfaction and end user performance was significant and positive (b=.539, p<0.001) thus H4 is supported. Hypothesis 5 predicted that higher levels of individual mindfulness can positively influence the satisfaction an individual perceives from his job. As expected, a significant positive relationship was found between mindfulness and job satisfaction (b=.110 , p<0.05), thus confirming H5. In addition, it was predicted that mindfulness decreases the impact of technostress stressors on individuals within organizational settings (H6). A significant positive relationship between mindfulness and technostress creators was obtained (b=-.166 , p<0.01), thus supporting H6. Additionally, H7 predicted that IT mindfulness enhances a user's satisfaction with the utilized ICTs at work. A significant positive relationship between IT mindfulness and end user satisfaction was found where b=.414 and p<0.001 thus confirming H7. Furthermore, H8 hypothesized that IT mindfulness reduces the impact of technostress on individuals. A significant negative path between IT mindfulness and technostress creators was obtained where b=-.547 and p < 0.001 thus H8 is supported.

As mentioned in section 5.3.1, the researcher decided to impute the missing data of the collected sample. Academic literature suggests that in case of the imputation of the missing data, SEM analysis should be conducted both with the imputed sample and the listwise sample in order to ensure that results are the same (Tabachnick and Fidell, 2014). For this reason, the research conducted the SEM analysis with the listwise sample (complete case approach) also where results in AMOS 23 showed that all hypotheses are confirmed thus validating the imputed approach that the researcher decided to follow. Results of the listwise SEM analysis can be found in Appendix E.

5.9 Qualitative data analysis

The research methodology and design of the current study, as described in detail in Chapter 4, involved two phases; the first phase included a quantitative research approach following an online survey and the second phase included the conduction of semi-structured interviews with 10 participants. After delineating the analysis of

the quantitative part of the study, in this section the analysis of the qualitative data will be presented.

The data derived from the semi-structured interviews was analysed by deploying thematic analysis (Braun and Clarke, 2008). Before the actual execution of the analysis, the researcher needed to undertake a number of important decisions. In the current study, the researcher followed a deductive or else theoretical way of analysis of the qualitative data by adopting a theory-driven code development based on mindfulness that has been adopted as the theoretical lens of the current study. As a result, the thematic analysis was guided by the theory of mindfulness for the development of codes and overarching themes. Moreover, an additional decision that a researcher needs to take is the level of discovery of the themes in the collected data and whether these identified themes are semantic or latent in nature. In the current study, the researcher followed a latent interpretation of the gathered data, or else a latent level of analysis, going beyond the surface meaning of the data and seeking to understand the underlying ideas and assumptions that inform the content of the data (Braun and Clarke, 2006). The choice of the latent level of analysis was deemed as most suitable and appropriate for the current study; as the researcher seeks to gain insight into how mindfulness affects each one the stressors of technostress, inferences on mindfulness are needed to be made thus going behind the surface content of the collected data. The thematic analysis of the gathered data was conducted, as explained already in Chapter 4, by following the procedures recommended by Braun and Clarke (2006):

- **Step 1 (Familiarize with data):** The researcher transcribed the interviews from the audio recordings while at the same time ensured to thoroughly read and re-read the data making notes for any potential interesting patterns that would be used to create initial codes.
- **Step 2 (Generate initial codes):** The researcher started the coding process on the collected data by identifying patterns and interesting pieces of information that would offer an interpretation of aspects of the investigated phenomenon (Boyatzis, 1998).The developed codes ranged from few words to maximum two lines. Furthermore, the researcher conducted a manual

procedure of coding, without using any particular software, since the amount of data allowed for a manual handling as well as offered the opportunity to immerse in more depth into the collected data.

- **Step 3 (Search for themes):** During this stage, the researcher organized all the identified codes into groups and tables in order to seek for potential overarching themes. Guided by the theoretical framework of the current study, the researcher developed themes that were matched with the theoretical foundation of the study.
- **Step 4 (Review themes):** The developed themes were reviewed and refined, ensuring that they are relevant both to the coded extracts and the whole data set.
- **Step 5 (Define and name themes):** The themes were further refined by creating sub-themes; Furthermore, each theme was appointed with a title and a clear definition delineating the aspects of the data that it captures.
- **Step 6 (Produce analysis):** By using the theory driven developed themes, the researcher produced the analysis of the collected data by choosing the most vivid examples and extracts representing the points that were deemed as essential to be demonstrated. The researcher ensured that the produced analysis was beyond a merely description of the data encompassing strong arguments towards the understanding of how mindfulness affects each one of the technostress stressors.

Before the beginning of each interview, the researcher asked each participant to fill in a two-page questionnaire, assessing the individual's levels of mindfulness and IT mindfulness. The tests were used as a means of mindfulness and IT mindfulness assessment. In that way, during the data analysis the researcher can combine the mindfulness scores with the individual's responses to the interview questions, gaining insights into the relationship between mindfulness/IT mindfulness and technostress. As depicted in Table 5-24, the range of MAAS scores was 3 – 6 showing a moderate to high level of mindfulness, while the range for IT mindfulness (ITM) was 2.75 – 4 revealing a moderate to high level of IT mindfulness of the respondents. The range of values in both mindfulness scales show that all

interviewees participating in the semi-structured interviews are characterized as moderately mindful and IT mindful individuals.

Id	Job description	Duration	Work experience	MAAS	ITM
#1	Architect	00:15:50	2 years	3	3.75
#**2**	Marketing Executive	00:14:46	<1 year	4	3
#3	IT Support	00:16:44	14 years	4.3	3.75
#4	Insurance Executive	00:20:15	1,5 years	3.2	2.75
#5	Accountant	00:39:50	4 years	4.2	4
#6	Business Analyst	00:17:22	3 years	6	4
#7	Lecturer	00:28:26	1 year	4.3	4.75
#8	IT Advisor	00:21:38	12 years	3.3	3.25
#9	Management Consultant	00:20:10	5 years	3.2	2.75
#10	Social Media Manager	00:13:39	<1 year	4.8	3.5

Table 5-24 MAAS and ITM scores of interviewees

As explained in Chapter 4, the researcher conducted semi-structured interviews aiming to explore the 'how' in the relationship between mindfulness/IT mindfulness and technostress; In other words, how does mindfulness affect each one of the technostress stressors. After careful analysis of the collected data, two overarching themes were identified in the data depicting: 1) the strategies that individuals are deploying during experiences of technostress in the workplace and 2) their perceptions during these experiences. Under these two overarching themes, several sub themes were identified that were categorized as more mindful and less mindful as depicted in the Table 5-25 below. As a result, it becomes apparent that individuals deployed several mindful strategies as well as expressed mindful perceptions during their technostress experiences within the workplace.

Strategies		Perceptions	
Mindful	**Less Mindful**	**Mindful**	**Less Mindful**
Prioritization	Constant availability	Perceive as no threat	Stress induced perceptions
Focus of attention	Switching of attention		
Acceptance of situation as is			
Acting to resolve situation			
Update skills and knowledge			
Adaptation to different contexts			

Table 5-25 Themes and sub themes identified in the data

During our thematic analysis, strategies that more mindful and IT mindful individuals deploy during ICT stressed situations as well as their perceptions were revealed; some uncovered strategies are relevant to several stressors, such as prioritization deployed during overload and invasion situations while other revealed strategies, such as focus of attention, were relevant only in specific stressor situations. In Table 5-26, all revealed mindful strategies and perceptions and the respective stressors are depicted for summarization purposes.

Stressor / Strategy/Perception	Overload	Invasion	Complexity	Insecurity
Prioritization	√	√		
Focus of attention	√			
Acceptance of situations as is			√	√
Acting to resolve situation			√	
Update skills and knowledge			√	√
Adaptation to different contexts	√	√	√	
Perceive as no threat	√	√	√	√

Table 5-26 Mindful strategies and perceptions per stressor

In the sections that follow, the identified strategies and perceptions are described in detail one by one, accompanied by vivid quotes that were extracted from the interviews. However, it should be noted that all strategies are highly connected and interrelated with each other as they are considered as underlying mechanisms of the overall notion of mindfulness. The strategies and perceptions are discussed separately in each sub section for the sake of clarity and comprehension for the reader and we consider them not as separate entities but rather interdependent 'forming' synergistically the construct of mindfulness.

5.9.1 Prioritization / Constant availability

Prioritization refers to the evaluation of a group of items or tasks and the ranking of them in a particular order according to their importance and the priorities of the individual. The majority of the participants stated that during 'techno - overload' situations, where incoming emails pop up, multiple interruptions and distractions occur, such as colleagues asking for help or clients are coming in the office while the individual is working on a task, prioritization of tasks was the primary deployed

strategy in response to these situations. One of the participants clearly explained the notion of prioritization by mentioning that tasks considered as most important are ranked as first in order to be dealt with:

' You need to prioritize and understand what is more urgent [..] I prioritize the tasks and see what is more important' (PC1)

While another participant stated that the position of the person who is interrupting plays an important role:

'*Probably, it is a distraction in some respects, but it also depends on who it is and what position they are, where they are in the company ... It is not so much a distraction as it is prioritization'* (PC5)

Findings revealed that while individuals employ prioritization, they also take into account additional factors; depending on the urgency of the current task or matter, the importance of the current working task or as the position of the colleague as well as the elements of an incoming email, such as the subject, content and sender, the majority of the interviewees stated that interruptions will be ranked and dealt with accordingly based on defined priorities. One participant described that when several incoming emails pop up, he will first check the content of the email and determine the urgency of the matter, as well as the person who sent it and accordingly he will apply prioritization of tasks. Especially when the current task is important, one participant described how he omits any incoming interruptions until he finishes the current task:

'If I am in the middle of something that is quite important, then I will just ignore the incoming email until I finish. If it is just day to day work, ... , and not actually in the middle of some complex operation, then as soon as a receive the email, I try to respond' (PC3)

As a result, findings revealed that by deploying prioritization of tasks individuals are able to effectively deal with 'techno overload' situations thus remaining effective and productive at work. As all participants were assessed as moderately mindful, it can be inferred that prioritization constitutes an effective strategy of mindful individuals towards decreasing techno overload. By prioritizing competing tasks,

mindful individuals are able to adapt to the demands of each occurring situation, exhibiting resilience, focusing on the most important matters and feeling a sense of control over the ubiquity of ICTs in their work environment.

Furthermore, prioritization was reported from many participants as the deployed strategy when individuals experience 'techno invasion' situations at the workplace. Technology can create blurring boundaries between work and personal life, with incoming emails, texts and other kinds of communication enabled by ICTs forcing individuals to be constantly available, outside the conventional work hours as well as during weekends and holidays. For some participants there are clear boundaries between personal and work life however a prioritization strategy outside of working hours is implemented depending on the urgency of the situation. One of the interviewees explains this notion by describing that during an emergency situation, such as the end of the month, the financial accountant might need help over the weekend if the system crashes, so the interviewee will check his email and respond only on this case:

'... If something goes horribly wrong and the system crashes, I'll get an email on Sunday. Now, I'll check that, purely and simply because this is an emergency situation. So it 'll be that case where the Blackberry is ON, email from Mark? No, then, the Blackberry is off'(PC5)

While another participant described how he implements prioritization of communications during the weekend trying to put less than 100% of his efforts on the urgent situation:

'... I try to put some efforts but not 100% over the weekend anyway'(PC7)

In contrast, less mindful individuals tend to be constantly available, mainly through their mobile phones, experiencing feelings of stress due to the constant connectivity enabled by ICTs rendering the boundaries between work and personal life blurry:

'Stress, yes in terms of emails, you can always be reached by an email so even through your mobile or at your lunch break or everywhere that's ... stress' (PC6)

When participants were asked about their availability outside of work and whether they have time to unplug one participant mentioned feeling an inner obligation for availability and responding to emails:

'I was trying to completely unplug, but if something is going on, it will still be in my mind...' 'Sometimes, people don't really expect you to reply, but I feel that I need to, yes. I don't know why it is happening!' (PC4)

While another interviewee explained that he is always connected, with no boundaries existent, even during holidays, as he characterizes himself as a person that 'likes to know what is going on':

'So I've got my work email connected to my phone, so even when I am on holiday, I could turn the email on my phone off, but I don't' (PC3)

Overall, findings revealed that although most of the individuals receive emails outside of working hours, more mindful individuals deploy a prioritization strategy in order to deal with techno invasion. Varying their response depending on the urgency of the situation, mindful and IT mindful individuals effectively tackle feelings of techno invasion, as they define their own priorities and choose by themselves, instead of being forced by technology, when and under which circumstances they want to be available and contactable. On the other hand, less mindful individuals are more affected by techno invasion, feeling stressed from technology ubiquity as they are constantly available and contactable outside of working hours.

5.9.2 Focus of attention / Attention switching

When individuals were asked how they respond to situations of multitasking with many incoming interruptions and occurring distractions (techno overload) while working on a task, many of them described that they focus their mental resources and attention on one task at a time, omitting any disturbing, unrelated information. One interviewee described that when a task is very important, any incoming email or task will be treated as an interruption:

'... it depends on how much focus you need to put on what you are doing. If it is really something that you don't have to make mistakes and the task is very specific, then, you don't want to be disrupted. For example, in my previous job, if I was looking for a code bug (looking in the logs files), so I am looking for something so specific and I am doing comparison between files, then I don't want anyone to bother me' (PC2)

While another participant describes that he strives always to focus 100% of his resources on one task at a time by avoiding multitasking and instead prioritizing competing tasks by knowledgeably shifting his attention to the one that he considers as most important:

*'Usually, I am a person just focusing 100% on what I am doing, so when I am working on a paper, and somebody comes, then, I can't do 50% ' (*PC7)

Despite working in a dynamic and constantly evolving environment, mindful individuals choose to focus their attention on one task at a time, able to not get distracted by unrelated tasks or interruptions. In contrast, less mindful individuals engage in multitasking, switching their attention from the main task at hand to other interruptions, thus causing vital information of the main task to be missed. For example, one participant mentioned that he uses a recording device during his client meetings, as he is performing multitasking almost every day thus he gets distracted and crucial information can be missed:

'So like, I use this (recording machine) sometimes to record and when I am less busy with other clients, I listen to it if I need to prepare my report and I found it very useful, and if I don't have it, then, I won't be able to listen to them properly' (PC8)

As a result, it becomes apparent that more mindful and IT mindful individuals are able to focus their mental and physical resources on one task at time; preventing getting distracted from incoming interruptions occurring in the environment, as well as consciously shifting their attention to the matter that they value as most important at the present moment thus decreasing the impact of techno overload. However, less mindful individuals tend to lose their focus on the current working task by engaging

in other tasks at the same time thus ending up missing vital information of the main task at hand.

5.9.3 Acceptance of situation as is

Acceptance of the situation as is refers to the strategy of an individual, when encountering a stressful situation caused by ICT usage, who acknowledges and perceives experiences with less negative emotions as well as accepts the idea that some things cannot change but instead we need to accept them as they are. When participants were asked about techno complexity experiences at work, referring to technology failures, errors and problems while working on a task, some participants stated that they are used to such situations and accept them as they are without experiencing any negative emotions:

'So, (you) learn living with the technology' (PC2)

'Things like that when you work in IT, they are everyday things' (PC3)

Another respondent explained that by accepting his own mistakes, in this case not saving his work on the computer thus having to repeat the task starting from scratch during software and hardware crashes, proved to be a beneficial experience to him, offering him space for personal growth, enhancing his self-competence and individual productivity:

'... So, it does not bother me because I learnt to accept the fact that If I am the idiot and I don't save something, I know I can re-do it again quicker. If the system crashes and I lose a portion of my work, then I know that I can go back and get it quickly' (PC5)

By admitting his own mistakes, the respondent accepts the situation without feeling negative emotions or judgmental to himself thus being able to return back to re-do the task, evaluating this experience as having learnt something of value and accepting it as an opportunity for future growth.

Overall, the findings showed that mindful individuals respond objectively to technology failures and problems while working on a task (techno complexity) by accepting the occurring situation as is and feeling less negative emotions. As a result, it can be inferred that by accepting the situation as is, mindful individuals are left less depleted after an ICT stressful event thus are able to significantly decrease the impact of techno complexity.

Furthermore, acceptance emerged as a deployed strategy towards situations of techno insecurity. Individuals expressed positive perceptions and agreement with the notion that technology can replace their positions someday in the near future while at the same time they didn't perceive it as an immediate threat:

'Everything is possible with technology' (PC7)

Thus, it can be argued that mindful individuals feel less threatened by emerging technologies by accepting the possibility of getting replaced, not perceiving it as a negative event as well as being open to novel things and perspectives.

5.9.4 Acting to resolve situation

Findings revealed that in situations where technology failures occur during the workday such as computers crashing and applications running slow, several individuals responded by trying to find a solution and resolve the problematic situation either by asking help from IT support or by implementing workarounds or even both. One participant in particular explains that the delayed and ineffective service of IT desk led him into implementing workarounds:

'... I went few times to the IT office downstairs. I went to the computer centre... when I know that somebody would contact me, then I ask them to send me emails to my personal email (Gmail account)' (PC7)

Another participant described that the first strategy when facing a technology crash is to attempt to fix it by own means and then resort to IT support:

'We do have IT desk, so personally, I try to do it on my own first, because going to the IT desk might take some time.. So, I try to fix it on my own, and if I can't then, I have to ask for help from someone else' (PC1)

Findings showed that mindful and IT mindful individuals, feeling more confident as well as in control over problematic situations occurring due to ICTs, take the initiative acting towards resolving the occurring problems. Instead of being absorbed by habitual thoughts and feelings, such as frustration and stress, mindful and IT mindful individuals show eagerness to conclude their work tasks when problems occur, exhibiting innovativeness by seeking alternative and workaround solutions or resorting to the IT support department of the company, thus tackling the impact of techno complexity.

5.9.5 Update skills and knowledge

The majority of the interviewed participants stated that they are not afraid of getting replaced either by emerging technologies or by other people as they strive to update their skills and knowledge by getting involved into new things and are eager to constantly evolve. One participant in particular clearly expresses this notion by highlighting also his feelings of certainty and control over technology:

'My own aspect is that you need to be updated about what is happening. See what is happening around you... Technology cannot change me, I will change technology.. So, you need to put yourself up to speed' (PC8)

Furthermore, many participants showed eagerness towards enhancing their skills and knowledge thus equipping themselves against the idea of becoming obsolete due to the constant updates and upgrades of organizational ICTs. Either through self-study or by attending organizational training programs, individuals seem to be very aware that they need to be up to date with technological advances in their domain. One participant explains the importance of attending training programs in order to stay ahead of colleagues, instead of falling behind and thus avoid risking her position in the company:

'You can't stay behind, otherwise you are out' (PC2)

While another participant delineates that his personal characteristics, such as innovativeness and curiosity, drive his eagerness towards self-studying in order to stay up to date in his domain:

'*I am very innovative. My course now (MSc), is really helping me in that. And, the PhD idea is part of this… Because, for you to be innovative, you need to rely on something, and make time for yourself to understand what is happening in the educational system, because nobody will just tell you this is what is going on' (PC8)*

As a result, it becomes apparent that mindful as well as IT mindful individuals are willing as well curious to pursue learning activities towards updating their skills and knowledge thus 'shielding' themselves from becoming obsolete in a dynamic and constantly evolving working environment filled with continuous upgrades in technologies and organisational ICTs. Thus, in this way IT mindful individuals combat the impact of techno complexity.

5.9.6 Adaptation to different contexts

A major theme that emerged in the collected data was the ability of participants to adapt to different contexts and more specifically to vary their response to the various occurring distressing situations, each time depending on the context and circumstances. Some of the respondents reported that in situations where technology and ICTs created feelings of stress they postponed their response and by taking a break. During an ICT stressful situation, a participant explains that a break from technology helps her towards tackling feelings of techno invasion:

'…when sometimes I am so fed up, I will just go for a walk and leave it (phone) home. I need to leave it be away from me and then I am fine' (PC2)

While another participant described that by postponing his response, he is able to take a step back from the occurring situation and react more objectively. When

incoming emails and information overload (techno overload) occur he acknowledges his current feelings and consciously takes a break before responding:

'...so I am very careful how I respond to emails. Also, if it is something that has upset me or angered me, then I might give it a while and then respond...' (PC3)

The strategy of 'taking a step back' is also deployed during technology failures at work (techno complexity) where an interviewee stated that he consciously steps away from a technology crash, while waiting for IT support to fix the problematic issue, accepting the occurring situation and without experiencing negative feelings:

'I tend to go and make a coffee. If something is crashed, then, there is nothing I could do anything about it, so I sit back and fire up a ticket that say this needs to be fixed' (PC5)

By adapting to different contexts, and more specifically by varying their response depending on the context of the present moment, i.e. work or personal time, individuals decrease the impact of techno invasion. One participant vividly explains how he has created clear boundaries between work and personal life by limiting his availability outside of work settings, adapting to different contexts and unplugging from work when reaching home; thus decreasing the impact of techno invasion:

'Yeah, generally it is a rule for me (to unplug) as soon as I step out the door…By the time it gets from work to home, I completely unwind. .... My wife hates it. She hates the fact that I just unplug. Just switch off and go' (PC5)

Another participant describes that the severe effects of techno invasion can be mitigated by adapting her response to different contexts; for example, when on holidays she is considerably limiting her availability to work related interruptions:

'...basically you tend to work from the morning until the moment you go to bed. You don't have this 8 to 5 work time, so when I go to holiday, then that is off (the phone)...' (PC2)

As a result, it becomes apparent that mindful and IT mindful individuals are able to adapt to different contexts either by focusing on the present moment and varying their response, limiting their availability or taking a step back from the stressful

situation and postponing their immediate response. Thus, they are able to react more objectively during the stressful occurring situation, experiencing less negative emotions and left less depleted. Thus, the impact of the stressor is decreased.

5.9.7 Perceive as no threat / Habitual perceptions

Another major theme that emerged in the collected data was that interviewees did not perceive the stressful situation as a threat for any of the four techno stressors (overload, invasion, complexity, insecurity). More specifically, in situations of techno overload with multiple incoming interruptions while working on a task, a participant mentioned that she doesn't perceive the situation as threatening but rather as a challenge to work more and be efficient:

'Sometimes when this happens I feel more happy because the situation triggers me' (PC1)

Likewise, during situations where ICTs allow constant connectivity out of working hours, participants described a similar perception; techno invasion was not perceived as a threat as individuals stated that they do not mind being contacted after working hours and they consider themselves flexible for client needs. Furthermore, during techno complexity situations findings also showed that participants accept the fact that technology failures happen sometimes but these situations do not create unsettling feelings. At last, regarding techno insecurity, findings showed that most of the participants do not feel risk over getting replaced either by new technologies or by other people. Adding to that, the majority of the participants expressed an openness to new talents coming in the company, even if it involves individuals more enthusiastic with technology and equipped with more technological skills:

'*if you hire the right people, then they would affect things positively, and I think fresh people or fresh blood helps a lot...' (PC7)*

Moreover, a very interesting notion was revealed from the analysis; The possibility that emerging technologies may replace people's job positions is viewed rather as an

opportunity for growth and move on to better, more interesting things than as a real threat:

'... I look at that as being opportunity to move on to better things that are more interesting… So, it is not something that I consider to be a bad thing. I think there is something positive to come out of it' (PC3)

As a result, it can be inferred that mindful and IT mindful individuals perceive IT stressful events as less threatening without adding automatic and habitual negative appraisals. Being open to multiple perspectives and aware of the present moment situation, more mindful and IT mindful individuals are able to construct new categories, avoiding habitual thoughts and automatic reactions, thus not perceiving as a threat any of the aforementioned stressors and decreasing the impact of technostress.

In contrast, findings showed that perceptions of less mindful individuals differ significantly; Less mindful individuals appeared to experience more unsettling feelings during ICT stressful situations at work. Most of the participants mentioned that they have experienced feelings of stress, frustration, annoyance and anxiety during techno stress situations within the workplace. During techno invasion occurring events, individuals reported that they have experienced connectivity pressure, feeling being always on 'standby' as well as great annoyance from the imbalance that technology invasion has created with their private life. Likewise, during techno complexity scenarios participants reported that technology errors and failures cause great amounts of stress and frustration as well as feelings of pressure to catch deadlines and finish their tasks on time and effectively. As a result, it becomes apparent that less mindful individuals tend to react more habitually, allowing the occurrence of automatic thoughts and reactions, being less able to combat the impact of the stressor thus experiencing distressing and overwhelming feelings from extended usage of ICTs.

5.10 Summary

The current chapter presented an in depth analysis of the quantitative data that was collected during the first phase of the study as well as the analysis of the qualitative data that complemented the first one and provided further insights. First, the analysis of the quantitative data is presented, that was gathered through an online questionnaire, including the pilot study results, preliminary analysis, descriptive statistics, reliability tests and demographics of the obtained sample (N=500). Then, the main analysis of the quantitative data was presented where Structural Equation Modelling (SEM) using AMOS version 23 version was deployed in order to run at first the Confirmatory Factor Analysis (CFA) and then proceed to the structural model in order to test our proposed hypotheses. Next, the qualitative analysis followed from the data collected through semi-structured interviews with 10 knowledge workers. The analysis of the qualitative data was presented, conducted with thematic analysis and identifying overarching themes in the data; strategies that mindful and IT mindful individuals deploy during ICT stressed situations as well as their perceptions. The thematic analysis confirmed the results of the quantitative phase of the study while also yielded further insights into the relationship of mindfulness and technostress.

Chapter 6: Discussion

6.1 Introduction

Chapter 5 of the current study presented the results obtained from the analysis of the collected data during the two phases of the study, the quantitative and qualitative phase. The results of the present study were obtained after testing the developed hypotheses of the proposed theoretical framework, examining the effects of mindfulness on technostress and related outcomes, through Structural Equation Modeling (SEM) as well as analysing the qualitative data of the second phase through thematic analysis. The aim of this chapter is to discuss the main results of the present study by offering an in depth interpretation of the quantitative and qualitative findings. Moreover, the present chapter provides an overview of the significance of the present research and its main contributions by discussing the main findings in relation to existing literature and studies within the area of mindfulness and technostress.

6.2 Overview of Quantitative and Qualitative Analysis

The previous chapter, Chapter 5, provided a detailed analysis of the testing of the developed hypotheses of the proposed theoretical framework aiming to investigate the role of mindfulness as an inhibitor to technostress as well as its impact to some selected job and end user computing related outcomes. Adding to that, the previous chapter presented the thorough analysis of the qualitative data, aiming to explore the 'how' in the relationship between mindfulness and technostress or else how does

mindfulness affect each one of the stressors. The present chapter aims to extend the results with theoretical underpinnings and relate them to the research question as well as the set objectives of the current study.

As previously mentioned in Chapter 2, stress in organizations has been widely investigated in the academic literature in several disciplines such as Information Systems, Management and Organizational studies. Workplace stress has detrimental effects on employees' health while at the same time causes severe negative socioeconomic consequences including reduced productivity, decreased job performance, higher rates of absenteeism and turnover intention, burnout and employee compensation claims (Wolever *et al.*, 2012; Van Gordon *et al.*, 2014; Shonin and Van Gordon, 2015) translating into huge monetary costs for organizations. A major source of stress within organizational settings is technology, as employees are obliged to utilize several different ICT applications in order to complete their work tasks. Technostress is described as the negative impact arising from ICT usage within the work environment and manifests in 'emotional and physical stress associated with technology and the introduction of new technologies' (Meischke *et al.*, 2015, p. 29). New information and digital technologies have changed organizational settings as well as the workload of employees thus contributing to higher levels of stress. Although a considerable amount of literature has been published around the concept of stress, in the IS domain research on ICT induced stress or else technostress is still in on its early stages (Tarafdar, Gupta and Turel, 2013; Yan *et al.*, 2013). Most of the existing previous studies suggest three organizational mechanisms as means to reduce the negative consequences of technostress, literacy facilitation, technical support and involvement facilitation (Ragu-Nathan et al., 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Tarafdar, Pullins and Ragu-Nathan, 2015). These mechanisms have become the main focus of extant studies in IS literature while there is a surprising paucity of research exploring further means that could alleviate the adverse aftereffects of technostress (D'Arcy, Gupta and Tarafdar, 2014). As a result, the present research aims to fill in this gap by examining mindfulness as a technostress inhibitor or else a method to buffer the stressors that cause technostress, alleviate the adverse effects arising from extended

ICT usage within organizational settings and ultimately contribute to employee well-being.

The present study has adopted mindfulness as a theoretical lens in order to investigate the phenomenon of technostress within organizational settings. To the best of our knowledge, this is the first research exploring the influence of mindfulness on the phenomenon of technostress contributing both to the technostress and mindfulness literature. The aim of the present study is to examine the effects of mindfulness on technostress, both in the work context as well as the IT context, by investigating its role into alleviating its negative impact on important work related outcomes such as job satisfaction as well as IT usage outcomes such as end user satisfaction and performance.

The analysis of the quantitative phase of the study confirmed all of the developed hypotheses thus confirming the proposed theoretical framework of the study. Results revealed that a more mindful individual is able to adapt and cope more effectively with technostress conditions that arise daily due to the extended use of organizational ICTs. As a result, a higher degree of mindfulness can alleviate the unsettling feelings of technostress experienced by individuals as well as mitigate the negative consequences arising from it by enhancing job satisfaction, employee satisfaction with ICTs and improving task performance. Moreover, the analysis of the qualitative part of the study validated the quantitative findings by confirming the negative impact of mindfulness on technostress stressors and also providing a deeper insight into this relationship. The qualitative analysis revealed the underlying strategies that mindful and IT mindful individuals deploy as well as their perceptions during technostress experiences at work thus shedding light on the path between mindfulness and technostress.

6.3 Discussion of Results derived from the first phase

6.3.1 Technostress on Job satisfaction

The present study suggested that technostress creators negatively influence job satisfaction (H1). After testing the proposed theoretical model through SEM, results showed a direct negative effect of technostress stressors on job satisfaction thus confirming H1. Individuals who experience higher levels of technostress within their workplace settings are more likely to feel decreased satisfaction with their job. This finding is consistent with existing literature, where evidence has shown that ICT induced stress conditions generate dissatisfaction at work (Ragu-Nathan *et al.*, 2008; Khan and Rehman, 2013; Kumar *et al.*, 2013; Fieseler *et al.*, 2014; Jena, 2015). Linked tightly both with individual work productivity as well as with attainment of organizational goals leading to organizational success, job satisfaction is a very important work related outcome (Ragu-Nathan *et al.*, 2008; Khan and Rehman, 2013; Chen and Muthitacharoen, 2016); Job dissatisfaction can diminish an employee's productivity, leading to considerable costs to organizations due to increased turnover intention (Ragu-Nathan *et al.*, 2008; Chen and Muthitacharoen, 2016). As a result, it becomes apparent that maintaining high levels of job satisfaction in individuals as well as seeking to eliminate any 'forces' that diminish job satisfaction within the workplace constitutes a major challenge for managers and organizations striving to reach their goals and ultimately success.

6.3.2 Technostress on end user satisfaction & end user performance

The present study has proposed that technostress creators negatively influence end user satisfaction (H2). In other words, individuals experiencing higher levels of technostress will report a lower satisfaction from ICT applications they are using for

their work tasks within organizational settings. The SEM analysis showed a significant negative correlation between technostress Creators and End User Satisfaction thus H2 is supported. Furthermore, our results confirmed H3 predicting that technostress negatively affects a user's performance while using ICT applications. As a result, empirical findings showed that ICT induced stress experienced by individuals generates dissatisfaction with the utilized ICT applications and systems and reduces ICT-enabled task performance. These findings are not surprising as they are is in accordance with previous extant research in the IS field (Chen and Muthitacharoen 2016; Tarafdar et al. 2010). Previous IS studies have empirically shown that technostress can severely impair both individual's satisfaction and task performance while utilizing ICT applications for their day-to-day work processes (Ragu-Nathan *et al.*, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Chen and Muthitacharoen, 2016) Therefore, it becomes apparent that although ICTs may offer significant advantages to today's organizations, without effective organizational mechanisms that can counterbalance technostress conditions the appropriation of benefits from implemented organizational ICTs is dramatically inhibited.

6.3.3 End user satisfaction on end user performance

The present study has also proposed that end user satisfaction positively influences end user performance (H4). As expected and consistent with prior research, our empirical results showed that H4 is confirmed thus revealing that employees' satisfaction with ICTs applications at work can significantly increase their task performance (Hsu, Lai and Weng, 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Hou, 2012). Doll and Torkzadeh, (1998, p. 261) define user satisfaction as 'an affective attitude towards a specific computer application by someone who interacts with the application directly'. Combining this notion with the Theory of Reasoned Action (TRA), stating that the attitude of an individual towards technology significantly influences his behaviour towards it, it is not surprising that our hypothesis was confirmed. Our findings suggest that individuals who feel more satisfied with the

ICT applications they are using at work, are more willing to explore further features of the system while also seek more effective ways in order to execute their work tasks thus enhancing their performance by becoming more productive as well as innovative (Tarafdar, Tu and Ragu-Nathan, 2010). From a practical standpoint, it can be inferred that by increasing users' satisfaction managers can significantly enhance employees' individual performance which in turn can greatly increase organizational performance and goal attainment. Thus, managers should seek to introduce organizational mechanisms that support and increase user satisfaction at work.

6.3.4 Mindfulness on Job satisfaction

The present study proposed that mindfulness is positively related to job satisfaction. Results showed a significant direct positive relationship between the constructs thus confirming H5. Consistent with previous studies, our results showed that mindfulness can improve an individual's job satisfaction (Hülsheger *et al.*, 2012; Mesmer-Magnus *et al.*, 2017). Our findings suggest that more mindful individuals are observing challenging events more objectively, without adding any negative appraisals to the occurring situation, and perceive them as less negative and less threatening thus being able to exhibit more positive feelings and attitude towards their job. Attentive and aware of the present moment experience, more mindful individuals are able to decouple from automatic thoughts and habitual reactions as well as deploy a more adaptive coping style during challenging situations that create dissatisfaction at work, responding to the situation with less negative reactions thus feeling a more positive attitude towards their job (Hülsheger *et al.*, 2012; Reb, Narayanan and Ho, 2015; Schultz *et al.*, 2015; Good *et al.*, 2016).

6.3.5 Mindfulness on Technostress

In the present study, we proposed that mindfulness negatively influences technostress creators. Our analysis showed a significant negative relationship

between mindfulness and technostress stressors thus H6 was confirmed. As no similar studies exist in the literature for the relationship between these two constructs, it becomes difficult to directly compare our results. However, we can relate to existing research on mindfulness and stress in working individuals. Previous studies have empirically shown that mindfulness is negatively associated with psychological distress and suggest that by being more mindful, individuals can substantially reduce their experiences of stress in the workplace (Grégoire and Lachance, 2015; Virgili, 2015; Grover *et al.*, 2016; Zimmaro *et al.*, 2016). Consistent with these findings, our analysis suggests that mindfulness can effectively decrease the impact of technostress stressors on individuals within workplace settings. By creating a space between emotions and reactions, a mindful individual perceives stressful events as not threatening or demanding but rather as manageable (Schultz *et al.*, 2015). Furthermore, a mindful individual is able to respond more objectively to stressful experiences, disrupting habitual thinking and automatic reactions. Automaticity arises from prior experiences of an individual, existing formed mental models and responses based on these previous similar experiences. By consciously attending on the present moment experience and disrupting the link between negative experiences and reactivity as well as negative emotions, a mindful individual is left less depleted after an adverse situation (Glomb *et al.*, 2011; Good *et al.*, 2016). Our findings suggest that mindfulness can successfully be used as an organizational mechanism to mitigate technostress conditions within the workplace. Extant literature has found that mindfulness interventions programs within organizational settings can greatly reduce stress experiences (Virgili, 2015) As a result, our findings support mindfulness' role as a technostress inhibitor that managers and corporations can adopt in their endeavour to tackle workplace stress while also increase personal as well as professional outcomes (Mesmer-Magnus *et al.*, 2017).

6.3.6 IT Mindfulness on end user satisfaction

The current study proposed that IT mindfulness is positively related to end user satisfaction. Results of SEM analysis revealed that IT mindfulness has a positive direct effect on individuals' satisfaction with ICT applications they are using for their work tasks thus confirming H7. In agreement with similar previous studies (Sun, 2011; Sun *et al.*, 2016), our results showed that IT mindfulness can directly increase an individual's satisfaction with the technology used for work related tasks and indirectly enhance task performance for ICT-mediated tasks. Being aware that technology usage can produce both successes and failures, an IT mindful individual is more flexible and adaptive during unexpected situations and stressful technology experiences at work (Sun, 2011). Curious to experiment with the features of the IT system as well as capable to implement 'workaround' solutions in order to achieve a fit between the deployed technology and the task at hand, IT mindful individuals are able to conclude their tasks even during challenging situations thus feeling more confident over ICTs at work; therefore showing a more positive attitude and positive feelings towards ICTs and exhibiting a greater user satisfaction (Thatcher *et al.*, forthcoming; Roberts, Thatcher and Klein, 2007b; Sun, 2011).

6.3.7 IT Mindfulness on Technostress

The present study proposed that IT mindfulness negatively influences technostress creators. The results of the SEM analysis revealed that IT mindfulness can effectively combat technostress conditions that arise within work settings thus confirming H8. Till today, there are no similar studies in extant literature that we can relate to and compare our findings. Previous technostress studies have posited that current stress inhibitors are ineffective in reducing the adverse aftereffects of technostress and more research is needed to identify more organizational mechanisms that can combat this phenomenon (Hung, Chang and Lin, 2011). Our findings showed that IT mindful individuals, open and aware of the system and ICT applications they are using, can effectively decrease the impact of technostress

conditions (Thatcher *et al.*, forthcoming). During a challenging or stressful situation, an IT mindful individual is able to adapt to the demands of the situation; instead of relying rigidly on old sets of methods and routines, an IT mindful individual creates new, innovative solutions or even finds alternative workarounds in order to resolve arising problems during daily work tasks (Langer, 1989; Roberts, Thatcher and Klein, 2007b). Open to new information and curious to learn new features of the system in use as well as explore new ICT applications and even invent new uses of them, an IT mindful individual feels in control over workplace technology and perceives it not as a threat but rather as a challenge (Thatcher *et al.*, forthcoming; Roberts, Thatcher and Klein, 2007b). Mindfulness interventions within organizational settings have been deemed as highly successful in decreasing workplace stress. Therefore, we suggest that IT mindfulness can be used as a powerful prevention mechanism by organizations in order to mitigate the impact of technostress stressors, reduce workplace stress costs and thus improve the overall performance of the organization.

6.4 Discussion of Results derived from the second phase

In this section, the findings of the second phase of the present study will be presented. Following a qualitative approach, the second phase of the study aimed to explore in more depth the relationship between mindfulness, IT mindfulness and technostress and how the first two impact each one of the stressors; while also uncover rich insights and reveal the underlying mechanisms that mindful and IT mindful individuals deploy during ICT induced stress situations.

In section 6.3 of the current chapter, we discussed the findings of the first phase of the present study that included a quantitative approach validating the proposed framework of the study examining mindfulness and IT mindfulness as methods to alleviate to technostress stressors that can mitigate its negative consequences in workplace settings. The analysis of the qualitative part of the study validated our

quantitative findings by confirming that mindfulness and IT mindfulness can decrease technostress stressors within organizational settings.

As presented in our discussion in Chapter 5, strategies that mindful and IT mindful individuals deploy during ICT stressed situations were revealed; some uncovered strategies are relevant to several stressors, such as prioritization deployed during overload and invasion situations while other revealed strategies, such as focus of attention, were relevant only in specific stressor situations. Since that most of the identified strategies relate to more than one stressor, the following discussion will be structured per strategy, rather than per stressor, in order to illustrate the underlying mechanisms of mindfulness relative to each strategy and perception.

There have been no similar studies in extant literature, investigating mindfulness and technostress stressors, that we can relate to and compare our findings. For this reason, we relate our results indirectly with existing mindfulness, stress and IS literature.

6.4.1 Mindfulness and Technostress

As thoroughly discussed in Chapter 5, the analysis of the semi-structured interviews revealed a number of strategies that mindful individuals deploy during stressful situations at work as well as their perceptions during these experiences. As already explained in Chapter 5 and also in agreement with extant research, although the underlying mechanisms of mindfulness can be described separately, in reality they are working synergistically (Alberts and Hülsheger, 2015). Thus for this reason, in this section we will discuss all identified mindful strategies and perceptions together.

Several previous studies have empirically shown that mindfulness can decrease the levels of stress that individuals experience at work (Roeser *et al.*, 2013; Grégoire and Lachance, 2015; Virgili, 2015; Grover *et al.*, 2016). Our findings support and extend previous research by revealing that mindfulness can decrease ICT induced stress that occurs within work settings.

Our findings concur with previous literature arguing that mindfulness fosters more effective stress processing. More mindful individuals cope with stress more effectively by using more adaptive strategies, such as direct dealing with the situation, acceptance and reinterpretation of the situation and less avoidant ways such as ignoring or escaping threatening stimuli (Weinstein, Brown and Ryan, 2009). Direct dealing with the situation or else called active coping refers to direct actions of an individual to deal with the stressful situation. Evident in our findings, active coping, or else as we named the theme acting to resolve, was an emergent strategy in our findings deployed by individuals during technostress related situations; more mindful individuals put an effort and strived to resolve the distressing situation, when computers crashed or applications errors occurred, in order to be able to conclude their work tasks.

Prioritization of competing tasks and most important assignments is one of the primary strategies that mindful individuals deploy during situations where extended ICT usage creates stress at work (Shapiro, Wang and Peltason, 2015). Fostering the ability to distance oneself from occurring stimuli, mindfulness allows room between impulse and reaction that an individual can utilize in order to notice distractions, prioritize and respond consciously and thoughtfully to demanding situations (Alberts and Hülsheger, 2015; Zivnuska *et al.*, 2016). Consistent with previous studies, our findings extend this notion by revealing that prioritization is a widely used strategy by mindful individuals during situations of techno overload and techno invasion at work.

Along with prioritization, focus of attention on one task at a time was found as a chosen strategy when individuals were faced with information overload, situations demanding switching of attention and multitasking at work (techno overload). Our findings concur with previous studies demonstrating that mindfulness can decrease the negative effects of multitasking by increasing the average time that an individual spends on one task (Levy *et al.*, 2012). Moreover, focusing on the IT context, Wolf, Pinter and Beck, (2011) have empirically shown that mindful individuals can mitigate the negative consequences of information overload by focusing their attention on the relevant task at hand. The ability of mindful individuals to focus

their attention intentionally on the current experience and omit any other incoming disturbing or unrelated information, but at the same time be aware of what is happening in the environment enables them to decrease the adverse aftereffects of techno overload situations. As a result, it becomes apparent that our findings, agreeing with extant literature, come as not surprising.

Moreover, taking a step back before reacting and responding to ICT stressful events was revealed as another strategy that mindful individuals deploy at work. Respondents in our study reported that during situations where technology and ICTs created distressing feelings, caused either by information overload (techno overload), technology invading personal life (techno invasion) or ICT applications crashing and producing errors (techno complexity), taking a break from the situation was the first resolution. Our findings are consistent with existing literature, explaining that the ability to take a step back from a situation is a major element of mindfulness lying upon the concept of 'response flexibility'. Response flexibility occurs when an individual is able to take a step back and 'slow down' before responding to any environmental stimulus (Glomb *et al.*, 2011; Malinowski and Lim, 2015; Shapiro, Wang and Peltason, 2015). Responding in a flexible manner gives the opportunity to the individual to carefully assess the situation before initiating any actions (Glomb *et al.*, 2011). Previous studies have shown that mindfulness fosters reduced reactivity to occurring events as well as the ability to disengage and take a step back from distressing experiences by inhibiting automatic and habitual reactions; Thus, individuals are able to pause, reflect and consider thoughtfully how to react to workplace stressful events (Glomb *et al.*, 2011; Malinowski and Lim, 2015).

Our findings also showed that mindful individuals are more likely to accept a situation as it is, without experiencing overwhelming feelings or striving to change a stressful event occurring due to the usage of ICTs (techno complexity, techno insecurity). Existing mindfulness literature agrees with our results describing a mindful person as one who does not attempt to change any occurring experiences but rather observes what is happening at the present moment with openness, curiosity, acceptance and a non-judgmental attitude ((Bishop *et al.*, 2004; Shapiro, Wang and Peltason, 2015). As already mentioned before, mindfulness fosters more effective

stress processing by using more adaptive strategies allowing acceptance and reinterpretation of the occurring situation (Weinstein, Brown and Ryan, 2009). Our results showed that during situations where individuals are facing difficulties due to technology errors and crashing applications while working on a task, acceptance of mistakes was revealed as an underlying mechanism of their coping strategy. More mindful individuals accept their mistakes and are able to go back to their task without feeling negative emotions or being judgmental; thus acknowledging that they have gained something of value from this experience. According to existing literature, an individual who perceives mistakes from a mindfulness perspective is looking at the 'silver lining' of the situation and is able to learn something of value, recognizing this experience as an opportunity for self enhancement and future growth (Carson and Langer, 2006).

A major theme that emerged from our findings was the fact that individuals did not perceive any of the technostress stressors as threats. Our findings were not surprising as they agree with previous mindfulness studies; More mindful individuals perceive stressful events as less threatening or demanding without adding automatic and habitual negative appraisals (Weinstein, Brown and Ryan, 2009). By creating a space between emotions and reactions, a mindful individual perceives stressful events as not threatening but rather as manageable (Schultz *et al.*, 2015). Interestingly, the majority of the participants reported feeling less negative emotions during distressing experiences at work where technology failures occur (techno complexity), incoming emails pop up after office work hours (techno overload) or new technologies and talents are introduced in the organization (techno insecurity). Our findings support previous studies suggesting that mindfulness fosters the generation and prevalence of more positive and less negative emotions during difficult situations (Glomb *et al.*, 2011; Good *et al.*, 2016). At last, very interestingly our findings showed that some participants perceived ICT demanding situations as a positive challenge or else as an opportunity for personal growth. As mindfulness facilitates decoupling reactions from previous negative experiences, it allows room for pause and reflection so that the individual can re interpret the situation thus

perceiving the stressor as a challenge that is beneficial rather than as a threat (Good *et al.*, 2016).

Overall, our quantitative findings, showing a direct negative relationship between mindfulness and technostress have been validated by the results of the qualitative analysis thus achieving data triangulation; Able to cope with stress more effectively, mindful individuals have a wider range and more adaptive coping strategies during stressful situations thus being able to decrease the impact of technostress stressors within workplace settings.

6.4.2 IT Mindfulness and Technostress

According to (Thatcher *et al.*, forthcoming) , IT mindfulness is 'a dynamic IT-specific trait, evident when working with IT' describing a user who is paying attention to the present moment and is willing as well as curious to experiment with the features of technology. IT mindfulness, oriented specifically in IT use and contexts, consists of four interrelated dimensions: Alertness to distinction, referring to the extent that a mindful individual understands the capabilities of IT applications and the context that they will prove more useful. Awareness of multiple perspectives referring to the mindful individual who is able to develop innovative solutions when problems arise in the working environment. Openness to novelty referring to the individual who is willing to explore more potential and novel applications of the deployed system as he is always curious and flexible to experiment with the features of the system. Orientation in the present referring to the mindful individual who is focused on the present moment and able to adapt his use of technologies at different contexts (Thatcher *et al.*, forthcoming); Roberts, Thatcher and Klein, 2007a).

IT mindfulness constitutes a rather under researched concept in IS literature; Firstly introduced by Roberts, Thatcher and Klein, (2007b), till today research focusing on IT mindfulness has been very limited (Thatcher *et al.*, forthcoming). Existing studies have investigated mindfulness in the IS domain mostly at the collective level whereas at the individual level studies are very limited. Till today, there have been

no similar empirical studies in extant literature investigating IT mindfulness and technostress stressors. As a result, it becomes apparent that it is difficult to compare and relate our results with similar studies.

Constant updates and upgrades of organizational ICTs as well as the emergence of new technologies create uncertainty and unsettling feelings to employees feeling they cannot keep up with the pace of new technologies, their skills are quickly becoming obsolete as well as fearing that they will lose their job. Our findings revealed that the major strategy individuals deploy towards combatting such distressing situations, techno complexity and techno insecurity instances, is the updating of their skills and knowledge. Extant research posits that IT mindful individuals are characterized as curious and open to new information and novel experiences while also open to intellectually challenging ideas. Also, IT mindful individuals are predisposed towards a novelty seeking behavior in use of IT as well as sensitive to their context; thus strive to stay aware of new developments (Langer, 1989; Roberts, Thatcher and Klein, 2007a; Carter *et al.*, 2011). According to (Thatcher *et al.*, forthcoming) an IT mindful individual is continually searching for opportunities in the IT context that will help him to use technology more effectively in order to complete his work tasks. In agreement with extant literature, our findings revealed that IT mindful individuals are curious to learn new experiences and enhance their intellectual skills while also recognize the need to stay up to date with technological trends and advances in their respective domains; thus, they strive to enhance their skills and knowledge either on their own or by participating in organizational trainings.

Also, our findings showed that more IT mindful individuals act to resolve problematic situations that arise at work due to ICT failures or errors instead of staying inactive unable to continue their work tasks. As Carter *et al.*, (2011) note, IT mindfulness is characterized by novelty seeking and novelty producing behavior in the use of IT, while '.. a lack of [IT] mindfulness is consistent with a tendency to persist in using well-learned routines ...' As a result, IT mindful individuals are able to create innovative solutions (Thatcher *et al.*, forthcoming) or even implement workarounds in order to achieve task technology fit (Roberts, Thatcher and Klein,

2007a). Moreover, IT mindful individuals are not committed into certain ways of using technology, but instead are continually searching for opportunities that could improve their technology use when executing their work tasks; thus they are flexible and able to adapt their technology use to dynamic and shifting environments and the context of each situation each time (Thatcher *et al.*, forthcoming). In accordance with extant research, our results showed that during technology failures such as computers crashing or applications running slow that create obstacles and difficulties in the execution of work tasks (techno complexity), IT mindful individuals strived to seek solutions exhibiting novelty seeking and novelty producing behavior; either by resorting to IT support and in the meanwhile use alternative means to run their tasks or by applying alternative solutions, adapting their technology use to the current context and implementing 'workarounds' in order to conclude their work tasks.

A major theme that emerged from our findings was that more IT mindful individuals were able to adapt to different contexts, sometimes also using prioritization at the same time. Our findings revealed that more IT mindful individuals are able to adapt to different contexts and vary their response and technology usage during techno invasion situations. During situations of incoming interruptions, such as emails occurring after office hours, during weekends or holidays, more IT mindful individuals were able to vary their technology use: By 'unplugging', limiting their availability and sometimes even defining priorities when being out of office, they were able to vary their technology use such as turning off the work mobile phone or using it only for personal circumstances thus creating clear boundaries between work and personal life. Our findings concur with existing research; According to Thatcher *et al.*, (forthcoming), IT mindfulness fosters sensitivity to different contexts and orientation in the present moment. IT mindful individuals are able to adapt their behavior to shifting environments, showing flexibility and resilience and becoming greatly involved in the current context. As they do not restrict themselves to pre committed ways of using technology they are able to adapt and thus vary their IT use depending every time on the current moment and their environment (Thatcher *et al.*, forthcoming).

Moreover, our findings showed that more IT mindful individuals are able to focus their mental resources and attention on one task at a time, omitting any disturbing, unrelated information during situations of incoming interruptions, emails and occurring distractions (techno overload); However, they remain aware of their context and environment, with certain priorities defined. For example, participants mentioned that when a task is very important they focus their resources on that but at the same time if something more important occurs they are ready to respond. Our findings come in accordance with extant research; IT mindful individuals are oriented in the present moment and their current IT context and technology use, focus on the immediate task at context and the specific situation but do not lose focus of stimuli outside the immediate task at hand (Thatcher *et al.*, forthcoming; Roberts, Thatcher and Klein, 2007a).

Another major theme that emerged within our findings was that individuals did not perceive technostress stressors as threats. Especially during situations that induce techno insecurity, individuals responded with acceptance, expressing less negative feelings thus perceiving the stressor as no threat; acknowledging the dynamics of emerging technologies and accepting the possibility that technology may replace their job position in the future. Interestingly, for some participants, this possibility was not perceived as a negative event but rather as an opportunity for growth and move on to better, more interesting things:

'.. I look at that as being opportunity to move on to better things that are more interesting… So, it is not something that I consider to be a bad thing. I think there is something positive to come out of it' (PC3)

Our findings agree with extant research; According to Langer (2014), stress is not a function of events but rather the view that each person takes of these events. An IT mindful individual, sensitive to different contexts and perspectives, does not rely on old and rigid categories but creates new ones depending on the context of the situation each time. As a result, IT mindfulness opens the views of individuals and disperses their stress, who don't perceive the possibility of losing their job to emerging technologies as something awful but rather as something inconvenient. By focusing on the advantages and opportunities that such a situation may bring, an IT

mindful individual is able to accept it and be fine with it (Langer, 2014). As Langer (2014) highlights, there are no positive or negative outcomes but only different paths that we can choose, with each one of them including both challenges and opportunities.

Overall, the quantitative findings of the first phase, showing that IT mindfulness can effectively combat technostress experiences of individuals within workplace settings, have been confirmed furtherly by the qualitative findings of the second phase of the study. By fostering sensitivity to different contexts, focus on the present moment, openness to novelty, new information and multiple perspectives, IT mindfulness can decrease the impact of technostress within the workplace. Moreover, our qualitative analysis revealed certain strategies that more IT mindful individuals deploy during technostress situations at work, thus yielding deeper insights into the relationship of IT mindfulness and technostress.

6.5 Overall Quantitative and Qualitative Findings

As already discussed in sections 6.3 and 6.4, the results of the first (quantitative) phase were furtherly confirmed by the second phase of the study, encompassing a qualitative approach.

Our quantitative analysis confirmed all of the proposed hypotheses thus validating the proposed theoretical framework of the study. Results in the first phase revealed that mindfulness and IT mindfulness can effectively combat technostress conditions within the workplace while also showed the role of mindfulness in enhancing work related and IT usage individual outcomes. Our findings were confirmed and enriched furtherly by our qualitative analysis. The results of the thematic analysis of the semi-structured interviews showed that mindful as well as IT mindful individuals are deploying certain strategies to deal with technostress situations at work while also react more objectively and are left less depleted after such events. As a result, it becomes apparent that triangulation was achieved by positively cross validating the results and findings of the two phases.

Acknowledging the limited focus of previous technostress studies, this study contributes to the technostress literature and provides an enhanced understanding of this phenomenon by investigating for the first time ICT induced stress (technostress) from a mindfulness perspective. The current study adopted a mindfulness approach and examined it as technostress inhibitor that can alleviate the exposure of technostress within workplace settings. Overall, our findings suggest that mindfulness as well as IT mindfulness are able to protect against the negative impact of stressful events that occur due to ICTs within the workplace (Voci, Veneziani and Metta, 2016). A more mindful individual is able to adapt and cope more effectively with technostress conditions that arise daily due to the extended use of organizational ICTs. As a result, a higher degree of mindfulness can alleviate the unsettling feelings of technostress experienced by individuals as well as mitigate the negative consequences arising from it by enhancing job satisfaction, employee satisfaction with ICTs and improving task performance. Either in the form of an intervention program embedded in the organizational settings or as a personal educational training, Mindfulness can contribute in protecting as well as enhancing employees' well-being while at the same time reduce workplace costs thus boosting the overall performance and success of the organization.

6.6 Summary

The current chapter provided an in depth discussion and interpretation of the findings derived from the quantitative and qualitative analysis by examining the findings and results of the current study in relation with the theoretical base and existing literature foundation and research on the areas of mindfulness and technostress. The chapter concluded by critically discussing both quantitative and qualitative findings of the study, summarizing the overall research findings and demonstrating the significance and main contributions of the current research.

Chapter 7: Conclusion and Further Research

7.1 Research Overview

Chapter 1 provided an introduction to the research area and problem of the current study while also presented the research agenda of the present thesis. The aim of the chapter was to highlight the importance of identifying additional mechanisms that can protect employees from technostress that arises within the workplace. Although the proliferation of Information Communication Technologies (ICT) within organizations has led to tremendous improvements in their performance and efficiency, those advances have come with costs. By explaining the importance of investigating the negative aspects of ICT usage and especially ICT induced stress while also introducing the concept of mindfulness and its role in reducing stress creating conditions, the chapter provided a research background on the investigated concepts of the study. Moreover, the chapter explained the motivation for researching these specific research areas, stemming from limitations in existing literature and gaps in scientific knowledge. The research question along with the aim and objectives of the current study were defined followed by a presentation of the methodological approach and research contribution of the study. The chapter concluded by developing an overview of the structure of the present thesis, providing the context of the following six chapters.

Chapter 2 provided a comprehensive literature review of existing research on the investigated concepts of the current study, namely technostress and mindfulness incorporating studies from several disciplines such as Business and Organization studies adding to IS literature. At first, the focus of the chapter was in providing a better understanding of the causes as well as the impact of technostress on work related outcomes while also present mitigating factors that can alleviate its negative

consequences. Moreover, the chapter provided an in depth examination of the concept of mindfulness. By delineating the several different operational definitions of mindfulness, stressing the fact that there has been no agreement on an unequivocal definition, the current chapter aimed to provide a thorough understanding of the concept of mindfulness along with its benefits, in and outside of organizational settings. Focusing on existing studies that have investigated mindfulness within organizational settings, the current chapter discussed the role of mindfulness in enhancing individual outcomes, especially work related outcomes such as employee performance as well as its role in reducing workplace stress. Also, this chapter presented a thorough overview of current research on mindfulness within the IS domain presenting the concept of IT mindfulness as well as discussing limitations and gaps in knowledge of existing mindfulness studies.

Chapter 3 provided the theoretical basis for the development of the theoretical framework of the current study and for the proposed hypotheses. The chapter presented the developed conceptual model of the current study that examines Mindfulness as a mechanism that can reduce technostress conditions as well as alleviate the negative consequences arising from technostress within organizational settings. Also, the developed hypotheses were presented, supported by theoretical underpinnings from existing mindfulness and technostress literature. The proposed research model is based on the transaction-based model of stress, a prominent stress model in the extant literature, adopting a mindfulness perspective that has not been investigated before. The aim of the model is to evaluate the effects of mindfulness on technostress on two contexts: the job-centric context with job satisfaction as an organizational job related outcome and the IT-centric context with end user satisfaction and end user performance as end user computing outcomes.

Chapter 4 provided an analysis of the research design and research methods that were implemented in the current study in order to examine the research problem and achieve the study's aim and objectives. The chapter discussed the several different research paradigms that exist in extant research and provided detailed justification for the selection of the positivist paradigm as the underlying research assumption of the current study. Moreover, the chapter described the strategy of inquiry of the

current study, following a mixed methods approach encompassing a quantitative approach at the first phase of the study and a qualitative approach at the second, complementary, phase of the study. After examining and justifying the reasons for selecting a mixed methods approach, the chapter continues in presenting the data collection techniques that were followed, constituting in a survey-based approach complemented by semi-structured interviews. The chapter concluded by presenting the data analysis techniques that were implemented during the current research, constituting in structural equation modelling and thematic analysis.

Chapter 5 presented an in depth analysis of the quantitative data and qualitative data that were collected during phases 1 and 2 of the current study. The current research achieved triangulation by complemented the first phase of the study with a qualitative investigation in the second phase. At first, the analysis of the quantitative data was presented, gathered through an online questionnaire, including the pilot study results, preliminary analysis, descriptive statistics, reliability tests and demographics of the obtained sample (N=500). Then, the main analysis of the quantitative data was presented where Structural Equation Modelling (SEM) using AMOS version 23 version was deployed in order to run at first the Confirmatory Factor Analysis (CFA) and then proceed to the structural model in order to test the proposed hypotheses. Next, the qualitative analysis of the data followed, collected through semi-structured interviews with 10 knowledge workers. The chapter overviewed the procedure of the semi-structured interviews and provided details on the recruited participants including occupation and levels of mindfulness and IT mindfulness. The analysis of the qualitative data was presented, that was conducted through thematic analysis, and the overarching themes that were identified in the data were discussed.

Chapter 6 provided a detailed overview and interpretation of the findings derived from the quantitative and qualitative analysis. The current chapter discussed the findings and results of the current study in relation with the theoretical base and existing literature foundation and research on the areas of mindfulness and technostress. Also, the current chapter provided a critical discussion of the overall

findings of the study, summarizing them and demonstrating the significance and main contributions of the current study.

Chapter 7 provided a detailed overview and summarization of all previous chapters of the current research as well as presented an in depth discussion of the theoretical and practical contributions of the current research. The chapter concluded by presenting the limitations of the present research and provided further research directions for further development of the investigated concepts.

7.2 Contributions

The aim of the present research was to evaluate the role of mindfulness in alleviating technostress and its negative consequences within organizational settings. By developing a theoretical model that examines mindfulness as a mechanism that can reduce the exposure of technostress stressors, this project aimed to explore the mitigating effect of mindfulness on the factors that create technostress and on the outcome selected work related variables. The current research was designed in order to meet certain objectives that were stated in Chapter 1 of the present study. These objectives were met as follows:

Objective 1: Gain a deep understanding of the phenomenon of technostress as well as the concept of mindfulness in existing literature. (Chapter 2)

A critical literature review was conducted on the phenomenon of technostress, presenting the theoretical background and existing research on technostress stressors, exploring the role of current technostress inhibitors as well as examining the impact of technostress on several work related outcomes. Furthermore, a thorough review of the concept of mindfulness was conducted in Chapter 2. Exploring the several definitions, instruments and measurements methods that exist in the literature and highlighting that there has been no agreement on an unequivocal definition, the concept of mindfulness was introduced, describing its accruing benefits both to individuals and organizations, aiming to provide a comprehensive understanding of

the concept. Moreover, this chapter offered an in-depth critical review of current literature on the concept of individual mindfulness in the workplace, focusing on its influence on various work related outcomes. Finally, the chapter concluded with a thorough review of existing mindfulness studies investigating the concept in the IS context, presenting extant findings as well as a critically overviewing existing limitations and gaps in knowledge.

Objective 2: Develop a theoretical framework examining the influence of mindfulness on technostress as well as on work related outcomes while also define the proposed hypotheses. (Chapter 3)

This objective was fulfilled in Chapter 3 where the theoretical framework of the current study was presented, examining the relationships of mindfulness and technostress with job related and ICT usage related outcomes. The chapter also provided the theoretical background that supports the proposed hypotheses of the current study.

Objective 3: Empirically validate the developed framework by examining the relationship of mindfulness with technostress stressors and the chosen job and IT usage related variables so as to indicate the framework's value and utility. (Chapter 5)

Objective 3 was empirically addressed in Chapter 5. The developed framework was tested through an online survey with a sample of knowledge workers (N=500). The theoretical framework was validated by testing the proposed hypotheses conducting SEM (Structural Equation Modeling) analysis on the collected quantitative data. The results of the analysis were presented in Chapter 5 along with the pilot study findings, preliminary analysis and descriptive statistics. The chapter presented the results of the analysis that confirmed all of the proposed hypotheses of the study.

Objective 4: Investigate in more depth the relationship of mindfulness and technostress by examining how mindfulness affects each one of the stressors. (Chapter 5)

Objective 4 was empirically addressed in Chapter 5. The current research followed a qualitative approach including semi-structured interviews in order to complement the

first phase of the study, and provide more insights into the investigated relationships. In Chapter 5, the current study presented the analysis of the qualitative data using thematic analysis that confirmed the findings of the quantitative phase of the study while also offered an in-depth examination of the 'how' in the relationship of mindfulness and technostress. By revealing the deployed strategies and perceptions of more mindful individuals during technostress experiences within the workplace, the thematic analysis yielded further insights into the effects of mindfulness on each one of the stressors.

Objective 5: Evaluate the role of mindfulness as a mechanism that can alleviate technostress and its negative consequences. (Chapter 6)

Objective 5 was achieved in Chapter 6. This Chapter discussed the main results of the present study by offering an in depth interpretation of the quantitative and qualitative findings extending them with theoretical underpinnings and relating them to the research question. By discussing the main findings in relation with existing literature and studies within the areas of mindfulness and technostress, the chapter provided an overview of the significance and the main contributions of the present research assessing the role of mindfulness and its impact on technostress and its negative consequences.

Objective 6: Enhance current knowledge in IS literature and provide managerial implications regarding the role of mindfulness as a mechanism that organizations can adopt towards enhancing individual outcomes and supporting employees' well-being. (Chapter 7)

Objective 6 was fulfilled in Chapter 7 and specifically in section 7.2. The theoretical as well as practical implications of the current research were discussed regarding the beneficial role of mindfulness in protecting employees against the negative impact of stressful events that occur due to the extended use of ICTs within the workplace. Demonstrating the significance of the current research and the contribution of our findings to theory, methodology and practice, Chapter 7 also discussed future avenues of research that arise from the outcome of the present study.

7.2.1 Contribution to Theory

The theoretical contribution of the current study constitutes one of the most important contributions of this research as it stems from the limitations that were identified during the extensive literature review that was conducted on two areas and concepts, mindfulness and technostress. By developing a theoretical framework that examines technostress within the workplace from a mindfulness perspective, the current thesis has made theoretical contributions to both research domains, mindfulness and technostress in IS.

The most important contribution of the current study constitutes in empirically revealing the role of mindfulness as a mechanism that can effectively reduce ICT induced stress or else technostress that arises within the workplace. There is a significant amount of literature focusing on investigating the salutary effects of mindfulness on stress and more specifically on work related stress; existing evidence has shown that mindfulness can decrease work place stress thus confirming its beneficial role on individual well-being and work life. However, till today there have been no studies investigating the effects of mindfulness on technology induced stress. As a result, the current study explored for the first time the phenomenon of technostress by adopting a mindfulness perspective.

Acknowledging the limited focus of previous technostress studies, this study contributes to the technostress literature and provides an enhanced understanding of this phenomenon by investigating for the first time ICT induced stress (technostress) from a mindfulness perspective. Previous studies have posited that current technostress inhibitors are ineffective in reducing the adverse aftereffects of technostress and more research is needed to identify more organizational mechanisms that can combat this phenomenon. Addressing this call for further research, the current study adopted a mindfulness approach and investigated the relationship of mindfulness and technostress in organizational settings. Our findings are promising and support that mindfulness and IT mindfulness have a significant role in decreasing technostress that arises within work settings. As a result, our study contributes and expands the technostress literature by identifying mindfulness as an

effective prevention mechanism that can be used to mitigate the negative consequences of technostress in the workplace. The importance of our findings lies in the identification of using mindfulness as a protective method against workplace ICT induced stress rather than as an after math solution; as highlighted by Alberts and Hülsheger, 2015, (p. 123) '[we need] … to prevent rather than cure work-related problems and enhance employee well-being rather than reduce illness'.

Moreover, the current study contributes to the emergent stream of research investigating the negative effects of ICT usage. Information Technology (IT) has been vastly characterized in the academic literature as a double-edged sword as the proliferation of ICTs within organizations has led to tremendous improvements in their performance and efficiency, but those advances have come with costs. Our findings extend existing literature investigating the negative aspects of ICT usage by confirming that technostress decreases users' satisfaction with ICTs as well as impairs users' performance, in terms of innovation and productivity, while using IT applications to execute their daily work tasks. As a result, the current study depicts the significant impact of technostress on individuals' satisfaction and task performance that hinders the ability of organizations to appropriate benefits from ICTs.

The third theoretical contribution of current study constitutes in the development of a comprehensive theoretical model examining the influence of mindfulness on the phenomenon of technostress and its negative consequences. The model was developed based on the transactional model of stress introducing mindfulness as a technostress inhibitor or else an organizational mechanism that can counteract technostress conditions. The current study adds to the transaction-based approach by identifying mindfulness and IT mindfulness as additional technostress inhibitors that can be effectively used to increase job related and ICT usage related outcomes and thus mitigate the adverse aftereffects of technostress. By combining for the first time the concepts of mindfulness, IT mindfulness, job related and ICT usage related outcomes in one unified model, the outcome theoretical framework of the current study constitutes a very important contribution to research that offers opportunities for further research.

Additionally, the current study broadens extant technostress literature by considering the end user computing perspective thus emphasizing the importance of ICT usage related outcomes such as end user satisfaction and end user performance. The majority of studies in technostress research have been focusing on the investigation of the impact of technostress on behavioural and psychological outcomes such as job productivity and organizational commitment. However, recent academic literature has proposed a third category of strain, that has been neglected by previous studies, introducing the perspective of end user computing. The theoretical model of the current study incorporates the end user computing perspective aiming to expand current research and offer venues for future research. Our findings show that technostress impairs user satisfaction with ICTs as well as user performance thus demonstrating the severe impact of this phenomenon not only on behavioural and psychological outcomes but also on ICT usage outcomes.

Furthermore, the current study contributes significantly to extant mindfulness research in the IS field; Till today, existing research in IS has mostly focused on the concept of collective or organizational level of mindfulness while there is a relative paucity of research on the individual level of mindfulness. Few studies have investigated individual mindfulness mostly focusing on the technology adoption and post adoption context, suggesting that further research is deemed as crucial in additional research areas. Existing literature has proposed that other areas than technology adoption, such as technology usage and mindful system use, constitute fruitful and promising topics for further research regarding the concept of individual mindfulness. Addressing this call for research, the current study demonstrated the influence of mindfulness on technostress during technology usage and its positive influence on user satisfaction with the deployed ICTs. Thus, our findings expand current mindfulness research in IS adding to the technology usage research area that has not received significant attention yet, demonstrating the alleviating effect of mindfulness on technostress and more specifically revealing how more mindful individuals respond to technostress conditions during technology usage.

A major contribution of the current thesis constitutes in the generation of important and valuable insights into the role of mindfulness within workplace settings thus

contributing to the mindfulness literature in the Management field. The majority of mindfulness research has been focused on health and clinical settings, while recently there has been a surge of academic interest in the investigation of the concept and benefits of mindfulness within workplace settings. Most of the extant research has posited that mindfulness can offer benefits in the workplace by positively influencing several work related outcomes such as creativity, innovation, resilience at work, work engagement, productivity, absenteeism and turnover; however, to date there has been very little empirical evidence. Our findings revealed that mindfulness can improve individuals' job satisfaction, by perceiving challenging situations as less threating and thus showing more positive attitude towards their job. As a result, increased job satisfaction can result in enhanced well-being at work that can lower the rates of turnover intention and absenteeism. Furthermore, another very important work related outcome that researchers have been focusing their attention on is individual performance and its relationship with mindfulness. Although preliminary findings may support the role of mindfulness in enhancing the professional effectiveness of an individual, empirical evidence is still very scarce. The current study contributes to this gap of knowledge adding to extant literature; Our findings revealed that mindfulness enhances users' task performance, by increasing user satisfaction, when employees are using ICTs in order to execute their daily work tasks. Overall, the current study establishes the beneficial role of mindfulness in the workplace, by enhancing work related outcomes that ultimately contribute to individuals' productivity and well-being as well as the overall performance and success of the organization.

Moreover, the current research contributes extensively in the under researched area of the concept of IT mindfulness. Till today, there is a surprising paucity of research investigating IT mindfulness. Addressing this call of research and grounded on the seminal research of Thatcher *et al.*, (forthcoming), the current study adopted the concept and measure of IT mindfulness and examined its impact on ICT induced stress as well as on ICT usage outcomes. To our knowledge, this is the first study that empirically validates the alleviating effect of IT mindfulness on technostress and

its negative consequences. As a result, the current study expands current research on IT mindfulness and offers avenues for further research.

7.2.2 Contribution to Practice

The major practical contribution of the current study constitutes in revealing that individuals can experiences less ICT induced stress in the workplace by being more mindful. Since mindfulness can be learned and cultivated through training, mindfulness trainings can be incorporated into organizational programs to teach individuals the tools and strategies of mindfulness that can lead to reduction in technostress and improvement of well-being.

The current study offers an enhanced understanding of the concept of mindfulness, its relationship with technology induced stress and the benefits it can offer to organizational settings. Mindfulness as well as IT mindfulness constitute powerful mechanisms that can be embedded into workplace settings either in the form of a personal or organizational intervention program to improve employees work life and protect them from the adverse effects of extended ICT usage, such as reduced productivity, absenteeism, turnover intention and burnout as well as several physical and psychological problems that translate into huge monetary costs for organizations. Understanding the positive influence of mindfulness on ICT induced stress, corporate managers can introduce mindfulness programs for their employees aiming to reduce work place stress, arising from extended ICT usage, as well as to increase productivity, individual performance and individuals' well-being. Thus, it becomes apparent that organizations can reap considerable benefits by embedding mindfulness into workplace settings, training their employees and offering programs that support the practice of mindfulness in work settings. Overall, by teaching mindfulness to their employees organizations and corporations can achieve enhanced professional individual effectiveness that can contribute to increased overall performance translating into bigger profits and success for the organization. Having recognized the plethora benefits of mindfulness, numerous large enterprises such as Google, Facebook, Intel and Transport for London (TFL) (Chaskalson and Hadley,

2015) are already offering in-house tailored mindfulness sessions to their employees. Organizations can adopt already existing mindfulness intervention programs, such as MBSR or MBCT, or tailor their own mindfulness program according to their goals; For example, Google has created its own mindfulness program, called 'Search Inside Yourself', and has aligned it with its own organizational goals and values promoting not only stress reduction but also creativity, autonomy and joy of work. As a result, it includes topics such as mindful emailing, mindful listening and dealing with difficult conversations (Glomb *et al.*, 2011). Therefore, corporate managers have a wide range of options available deciding either to implement an already existing program or customize their own, including the core techniques and elements of mindfulness, tailored to their own organizational settings.

The final practical implication of the current study is that it provides a set of mindful strategies that corporate and HR managers can use and teach to staff in order to help employees to cope more effectively with technostress conditions that arise daily within work settings. The revealed mindful strategies of the present study, such as prioritization of competing tasks and focus of attention on one task at a time, can be used as a set of techniques that employees can deploy daily at work as they are relevant to everyday work life of today's organizational environments; situations where multiple incoming interruptions from several different ICT applications occur, information and email overload while an employee is working on a task or text and email communications happening after working hours. By adopting these strategies, knowledge workers can learn how to deal more effectively with distressing situations arising from technology usage, appropriate all the embedded benefits coming from using ICTs, such as increased productivity and performance, improve their work life while also contribute to the overall success of the organization.

7.2.3 Contribution to Methodology

The most important methodological contribution of the current study has been the use of a mixed methods approach on the investigation of the effects of mindfulness on technostress within organizational settings. In the current study, we deployed a

quantitative approach, using SEM analysis, that was complemented by a qualitative approach including semi-structured interviews in the second phase of the study. Self-report measures, incorporated in a quantitative approach, constitute the most dominant data collection method deployed by existing technostress literature with existing literature calling for further research to be conducted adopting mixed methods design. Moreover, in IS mindfulness literature there is lack of empirical studies examining mindfulness in the work environment. Researchers have highlighted the need for more qualitative studies employing interviews due to the scarcity of qualitative investigations on the concept of mindfulness. By adopting a mixed methods approach, the current study empirically confirmed the role of mindfulness in alleviating technostress and its negative consequences; while also provided deeper insights into how mindfulness affects each one of the stressors revealing the strategies that more mindful individuals deploy during technostress experiences.

Another key methodological contribution of the current study is the use of technostress scenarios during the semi-structured interviews in order to capture the perceptions and deployed strategies of individuals during such technostress situations at work. Moreover, the use of thematic analysis for analysing the empirical material gathered from the interviews constitutes an additional contribution of the current study.

Overall, the current study contributes and adds value to existing research in the research areas of technostress and mindfulness by using a mixed methods approach in the investigation of the effects of mindfulness on ICT induced stress and work related outcomes.

7.3 Research Limitations

The current study has investigated the influence of mindfulness on technostress within the workplace as well as its impact on work related outcomes. Our findings are promising and support that mindfulness and IT mindfulness have a significant

role in decreasing technostress conditions that arise within work settings. Moreover, our findings are useful both for the academic community and practitioners as having obtained a large sample (N=500) for the quantitative phase of the study and the empirical validation of the framework and also having used semi-structured interviews to complement and support the first phase of the study, thus achieving triangulation. However, the current study has some limitations that should be acknowledged.

At first, the current research used a Convenience sampling technique to guide the data collection and analysis for the purposes of the study. The sampling frame of the current study included knowledge workers, working individuals who are using technology daily in order to complete their work tasks. Although the demographics of the sample showed very similar characteristics and attributes with the demographics of the investigated population such as educational background and daily technology usage thus it can be argued that the sample is typical of the population, the researcher acknowledges that the convenience sampling technique limits the ability of the generalization of results to the whole population.

Furthermore, the current study used an online questionnaire in order to collect data during the quantitative phase of the study thus data was collected at a single point in time. Following the significant body of the existing literature that have been deploying mostly a cross sectional approach in the research areas of technostress and mindfulness, the current study complemented the quantitative phase with semi-structured interviews that confirmed the quantitative findings and provided more insights. However, the researcher acknowledges the limitations of the cross sectional strategy that precludes causal conclusions and recommends to future research the use of a longitudinal approach that would yield more insights into the investigated relationships.

At last, the use of self-report measures in order to assess mindfulness and task performance, variables included in the developed theoretical framework, constitutes a limitation of the current study. Regarding mindfulness, several studies have supported the validity of self-report measures for its assessment while evidence on the existence of bias, and especially social desirability bias, that may affect the self-

report assessment of mindfulness is still scarce and inconsistent. According to extant research, in order to overcome the limitation of using only a scale instrument to measure mindfulness, researchers recommend the use of mixed methods approaches incorporating qualitative investigations (Bergomi, Tschacher and Kupper, 2013; Sauer *et al.*, 2013). As a result, for this reason the current study complemented the quantitative phase of the study, that used self-report measures, with a qualitative investigation conducting semi-structured interviews that confirmed the findings of the first phase. Regarding task performance, the current study used a self-report assessment of an individual's perceived work performance, due to limited time and resources, thus a certain degree of bias might be involved. Thus, for these reasons it is recommended that future research may use alternative methods, such as observations or independent assessments of mindfulness and performance by supervisors or peers, for measuring these variables in order to address the limitations of self-report measures.

7.4 Areas of Future Research

The current study offered an enhanced understanding of the role of mindfulness as a mechanism that can effectively alleviate technostress experienced by individuals due to extended use of ICTs within the workplace. In this section, we describe more areas of future research expanding the ones that we already mentioned in the previous section.

The current study used a rather large sample (N=500) in the data analysis through Structural Equation Modeling (SEM). Although the sample size is considered as adequate for SEM, future research may recruit a much larger sample in order to establish more generalized results. Moreover, diverse populations, different industries and sectors could reveal different results. Future studies can be conducted in particular work contexts, such as IT corporations or bank firms, in order to gain a better understanding of the impact of technostress on important work related outcomes such as performance and the role of mindfulness in alleviating this

complex phenomenon within work settings. Thus, it is recommended that future studies may deploy a greater variety of contexts and samples in order to replicate the current study and validate our findings.

Moreover, future research may extend the developed framework of the current study in order to incorporate other potential constructs of individual outcomes different than the ones we used, such as turnover intention, organizational continuance and commitment or IT related outcomes such as intention to use IT, continuance usage intention and others. In that way, future research may evaluate the impact of mindfulness and IT mindfulness on additional individual outcomes that can affect employees' work life and well-being.

Furthermore, it is recommended that further studies may use experimentation or a longitudinal approach in order to measure technostress before and after the implementation of mindfulness practices as a technostress inhibitor. As in the current study we have adopted the perspective of mindfulness as an inherent trait or quality, it would be very interesting to test the effects of mindfulness meditation on the phenomenon of technostress within the workplace.

Also, the current study used the IT domain specific measurement instrument that was developed by Thatcher *et al.*, (forthcoming) in order to the evaluate the impact of IT mindfulness on technostress. As the current study used the short version of the instrument, validated by extant research, it is recommended to future research to replicate the current study by using the long version of the IT mindfulness instrument and validate the main findings of this research.

Moreover, the current study offers a deeper understanding of the concept of IT mindfulness and its impact on technostress and ICT related outcomes. To our knowledge, this is the first study that examines the influence of IT mindfulness on technostress. As a result, further research is recommended to explore this relationship in more depth. Also, as it is already mentioned before, the concept of IT mindfulness is an under developed concept in the area of IS. We hope that our findings will motivate future researchers to adopt the concept of IT mindfulness in more contexts, other than IT adoption and use, explore and investigate its influence

thus gaining a deeper understanding on IT mindfulness and its influence in the IT context and organizational settings.

Grounded on existing literature, in this study we have considered mindfulness and IT mindfulness as distinct concepts. Mindfulness is defined as a broad, more generic concept, explaining the behavior of an individual in various contexts of everyday life. On the other hand, IT mindfulness is defined as an IT specific trait, evident only when working with technology and oriented in the IT context. Thus, one person can be mindful but not necessarily highly IT mindful. Although previous empirical research has demonstrated that the two concepts constitute distinct entities, as this is out of the scope of the current research we suggest to future researchers to conduct further research in examining in more depth the relationship between the two concepts, establishing their similarities and differences.

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Appendix A

Online Questionnaire

Page 1: Introduction

Thank you for agreeing to take part in this survey that investigates the effects of mindfulness on technology induced stress within the workplace. You are invited to fill in a questionnaire that will take about **12 -15 minutes** to complete. Participation is voluntary and you can withdraw at any time. All responses are confidential and anonymous, and will be used for research purposes only. All the information collected from you will not be given to any third party and it will be safely stored and secured.

Prior to conduct this research, a research ethics approval has been obtained from the Research Ethics Committee at Brunel University. If you have any concerns or complaints regarding the ethical elements of this project, please contact Dr Anastasia Papazafeiropoulou Anastasia.Papazafeiropoulou@brunel.ac.uk or Tel. +44 (0)1895 266035.

Below is a collection of statements about your everyday experience. Using the scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

Please don't select more than 1 answer(s) per row.

	Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never
I could be experiencing some emotion and not be conscious of it until sometime later.	☐	☐	☐	☐	☐	☐
I break or spill things because of carelessness, not paying attention, or thinking of something else.	☐	☐	☐	☐	☐	☐
I find it difficult to stay focused on what's happening in the present.	☐	☐	☐	☐	☐	☐
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	☐	☐	☐	☐	☐	☐
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	☐	☐	☐	☐	☐	☐
I forget a person's name almost as soon as I've been told it for the first time.	☐	☐	☐	☐	☐	☐
It seems I am "running on automatic," without much awareness of what I'm doing.	☐	☐	☐	☐	☐	☐

I rush through activities without being really attentive to them.	☐	☐	☐	☐	☐	☐
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	☐	☐	☐	☐	☐	☐
I do jobs or tasks automatically, without being aware of what I'm doing.	☐	☐	☐	☐	☐	☐
I find myself listening to someone with one ear, doing something else at the same time.	☐	☐	☐	☐	☐	☐
I drive places on 'automatic pilot' and then wonder why I went there.	☐	☐	☐	☐	☐	☐
I find myself preoccupied with the future or the past.	☐	☐	☐	☐	☐	☐
I find myself doing things without paying attention.	☐	☐	☐	☐	☐	☐
I snack without being aware that I'm eating.	☐	☐	☐	☐	☐	☐

NOTE: The terms **'ICT'** and **'this technology'** refer to the day-to-day computer-based applications you use in your job, such as e-mail, office automation system, mobile technologies (cellphone, Laptop), Internet, Intranet, enterprise systems (eg. SAP, Oracle etc) and generic application technologies (word processing, spreadsheet, presentation).

2. **On a usual working day, considering the use of Information and Communication Technologies (ICTs) for your work-related tasks, please indicate the degree to which you agree to the following.**

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am very creative when using this technology.	○	○	○	○	○
I am often open to learning new ways of using this technology.	○	○	○	○	○
I like to figure out different ways of using this technology.	○	○	○	○	○
I get involved when 'using' this technology.	○	○	○	○	○

3. Below are a number of statements regarding job performance. Please read each one and indicate to what extent you agree or disagree with the statement.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
This technology helps to improve the quality of my work.	○	○	○	○	○
This technology helps to improve my productivity.	○	○	○	○	○
This technology helps me to accomplish more work than would otherwise be possible.	○	○	○	○	○
This technology helps me to perform my job better.	○	○	○	○	○
This technology helps me to identify innovative ways of doing my job.	○	○	○	○	○
This technology helps me to come up with new ideas relating to my job.	○	○	○	○	○
This technology helps me to try out innovative ideas.	○	○	○	○	○

4. Below are a number of statements regarding job satisfaction. Please read each one and indicate to what extent you agree or disagree with the statement.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
All in all, I am satisfied with my job.	○	○	○	○	○
In general, I don't like my job.	○	○	○	○	○
In general, I like working here.	○	○	○	○	○

For each one of the statements below, please fill in the blank describing how you feel about your overall experience of utilizing Information and Communication Technologies (ICT's) in connection with your work tasks.

5. **I am _____ with my use of ICT's in connection with my work tasks.**

- Very Disatisfied
- Disatisfied
- Neutral
- Satisfied
- Very Satisfied

6. **I am _____ with my use of ICT's in connection with my work tasks.**

- Very Displeased
- Displeased
- Neutral
- Pleased
- Very Pleased

7. **I am _____ with my use of ICT's in connection with my work tasks.**

- Very Frustrated
- Frustrated
- Neutral
- Contented
- Very Contented

8. **I am _____ with my use of ICT's in connection with my work tasks.**

- Absolutely Terrible
- Terrible
- Neutral
- Delighted
- Absolutely Delighted

9. On a usual working day, considering the use of Information and Communication Technologies (ICTs) for your work-related tasks, please indicate the degree to which you agree to the following.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am forced by this technology to work much faster.	○	○	○	○	○
I am forced by this technology to do more work than i can handle.	○	○	○	○	○
I am forced by this technology to work with very tight time schedules.	○	○	○	○	○
I am forced to change my work habits to adapt to new technologies.	○	○	○	○	○
I have a higher workload because of increased technology complexity.	○	○	○	○	○
I spend less time with my family due to this technology.	○	○	○	○	○
I have to be in touch with my work even during my vacation due to this technology.	○	○	○	○	○

10. On a usual working day, considering the use of Information and Communication Technologies (ICTs) for your work-related tasks, please indicate the degree to which you agree to the following.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I feel a constant threat to my job security due to new technologies.	○	○	○	○	○
I have to constantly update my skills to avoid being replaced.	○	○	○	○	○
I am threatened by coworkers with newer technology skills.	○	○	○	○	○
I do not share my knowledge with my coworkers for fear of being replaced.	○	○	○	○	○
I feel there is less sharing of knowledge among coworkers for fear of being replaced.	○	○	○	○	○
I have to sacrifice my vacation and weekend time to keep current on new technologies.	○	○	○	○	○
I feel my personal life is being invaded by this technology.	○	○	○	○	○

11. On a usual working day, considering the use of Information and Communication Technologies (ICTs) for your work-related tasks, please indicate the degree to which you agree to the following.

I do not know enough about this technology to handle my job satisfactorily	○	○	○	○	○
I need a long time to understand and use new technologies	○	○	○	○	○
I do not find enough time to study and upgrade my technology skills	○	○	○	○	○
I find new recruits to this organization know more about computer technology than I do	○	○	○	○	○
I often find it too complex for me to understand and use new technologies	○	○	○	○	○
There are always new developments in the technologies we use in our organization	○	○	○	○	○
There are constant changes in computer software in our organization	○	○	○	○	○
There are constant changes in computer hardware in our organization	○	○	○	○	○
There are frequent upgrades in computer networks in our organization	○	○	○	○	○

12. Are you male or female? ✱ *Required*

- ○ Male
- ○ Female

13. What is your age? ✱ *Required*

14. What is the highest educational level you have completed? ✱ *Required*

15. How many years have you been working in total? * *Required*

- 1-5
- 6-10
- 11-15
- 16 and over

16. How many years have you been working with your current employer? * *Required*

- 1-5
- 6-10
- 11-15
- 16 and over

17. What is your daily average IT usage at work? * *Required*

- less than 3 hours
- 3-6 hours
- >6 hours

Page 8: Thank you for participating in our survey!

Your contribution is valuable. Your response has been recorded.

If you would like to participate in the next stage of this research, please fill in your email here.

Appendix B

Sample Interview Questions

Interview Protocol:

- Can you tell me briefly what is your role at the company?
- How many years have you been working at the company?
- Can you give me a brief snapshot of your average day at work?
- Do you feel satisfied with the job you are doing?
- What would you change about your work?
- Can you describe all the devices connected to the Internet that you own?
- Can you describe your technology usage at work (mentioning any software applications & devices that you use for your work tasks)? How many technologies are you using?
- How many hours each day do you spend working with technology?
- How often do you read/check your email at work?
- When you get an email (at work), how soon do you feel you need to respond?
- Can you describe your multitasking during a regular working day?
- In your opinion, is it easier or harder to focus on the task at hand when you are engaged in other tasks at the same time?
- Sometimes, when you are at work, your phone rings, one/several email comes in and a colleague is asking for your help while you are working on a task/project. Can you please describe in detail a similar scenario in your situation starting at the beginning of the encounter and working your way through to the end? How do you usually respond in such a case?
- Are you expected to be contactable (approachable) outside working hours? How do you feel about this?
- Do you have time to unplug from your job completely?
- Sometimes you receive emails about work related issues, outside regular working hours, at night, during a weekend or your annual leave. Can you please describe in detail a similar scenario in your situation and how you usually respond in such a case?
- Are you expected to stay current with technological advances in your domain? - Do you have any examples to share?
- Sometimes companies decide to update technologies (operating systems, information systems, email clients) you might encounter errors & problems with the new applications, they might be running slow and/or crash while you are working on a task/project. Can you please describe in detail a similar scenario in your situation? How do you usually respond in such a case?
- Overall, do you like working with technology (a) or you think that it creates more stress for you at work(b)?

- What would you say is the most stress you have experienced with technology at work? Can you give an example?
- Sometimes employees in certain positions in a company, such as Social Media Managers, get replaced by newer, younger, more technological skilled people who have a higher level of competence with technology and are more enthusiastic to use new technologies. Is that a common encounter in your company?
- Some people believe that in the near future employees will be replaced by emerging technologies. What is your opinion? How do you feel about this?

Appendix C

Participant Information Sheet

Research Title: "Investigating Technostress within the workplace: A Mindfulness perspective"

Invitation:
You are being invited to take part in a PhD research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Please ask us if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part. Thank you for reading this.

Description and Purpose of the project:
My name is Athina Ioannou and I am a PhD student at Brunel University. The aim of this project is to evaluate the impact of Mindfulness on the stress induced by the usage of Information Communication Technologies (ICT) at work. The proliferation of Information Communication Technologies (ICT) within organizations has led to several improvements in their performance and efficiency but these advances are accompanied also by negative aspects. One negative aspect of ICT usage is the stress caused by ICT's, called technostress. technostress refers to the stress experienced by individuals in organizations due to the extended use of ICT's. The purpose of the project is to explore the role of mindfulness in alleviating the negative consequences arising as a result of technostress phenomena. You are invited to take part in an interview that will last about 20 minutes. Participation is voluntary and you can withdraw at any time without giving any reason. Your participation in this research study does not involve any kind of risks or costs. The information that you will provide will be anonymous and strictly confidential. Results will be presented at conferences and published in scientific journals. If any individual data are presented, the data will be totally anonymous, without any means of identifying the individuals involved. You will not be able to be identified in any reports or publications. All the information collected about you will not be given to any third party and it will be safely stored and secured.

Prior to conduct this research, a research ethics approval has been obtained from the Research Ethics Committee at Brunel University. If you have any concerns or complaints regarding the ethical elements of this project, please contact Dr Anastasia Papazafeiropoulou Anastasia.Papazafeiropoulou@brunel.ac.uk Tel. +44 (0)1895 266035

Consent form

Brunel University London

CONSENT FORM

	YES	*NO*
Have you read the Research Participant Information Sheet?	☐	☐
Have you had an opportunity to ask questions and discuss this study?	☐	☐
Have you received satisfactory answers to all your questions?	☐	☐
Who have you spoken to?		
Do you understand that you will not be referred to by name in any report concerning the study?	☐	☐
Do you understand that you are free to withdraw from the study:		
• at any time	☐	☐
• without having to give a reason for withdrawing?	☐	☐
(Where relevant) I agree to my interview being recorded.	☐	☐
(Where relevant) I agree to the use of non-attributable direct quotes when the study is written up or published.	☐	☐
Do you agree to take part in this study?	☐	☐

Signature of Research Participant:	
Name in capitals:	Date:
Witness statement	
I am satisfied that the above-named has given informed consent.	
Witnessed by:	
Name in capitals:	Date:

Ethical approval

College of Engineering, Design and Physical Sciences Research Ethics Committee
Brunel University London
Kingston Lane
Uxbridge
UB8 3PH
United Kingdom

www.brunel.ac.uk

5 September 2016

LETTER OF APPROVAL

Applicant: Miss Athina Ioannou

Project Title: Investigating Technostress within the workplace: A Mindfulness perspective

Reference: 3677-LR-Sep/2016- 4014-1

Dear Miss Athina Ioannou

The Research Ethics Committee has considered the above application recently submitted by you.

The Chair, acting under delegated authority has agreed that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that the conditions of approval set out below are followed:

- The agreed protocol must be followed. Any changes to the protocol will require prior approval from the Committee by way of an application for an amendment.

Please note that:

- Research Participant Information Sheets and (where relevant) flyers, posters, and consent forms should include a clear statement that research ethics approval has been obtained from the relevant Research Ethics Committee.
- The Research Participant Information Sheets should include a clear statement that queries should be directed, in the first instance, to the Supervisor (where relevant), or the researcher. Complaints, on the other hand, should be directed, in the first instance, to the Chair of the relevant Research Ethics Committee.
- Approval to proceed with the study is granted subject to receipt by the Committee of satisfactory responses to any conditions that may appear above, in addition to any subsequent changes to the protocol.
- The Research Ethics Committee reserves the right to sample and review documentation, including raw data, relevant to the study.
- You may not undertake any research activity if you are not a registered student of Brunel University or if you cease to become registered, including abeyance or temporary withdrawal. As a deregistered student you would not be insured to undertake research activity. Research activity includes the recruitment of participants, undertaking consent procedures and collection of data. Breach of this requirement constitutes research misconduct and is a disciplinary offence.

Professor Hua Zhao

Chair

College of Engineering, Design and Physical Sciences Research Ethics Committee
Brunel University London

Appendix D

Table 1. Missing Data

Variable	Frequency	Percent
M1	1	0.20%
M2	4	0.80%
M3	3	0.60%
M4	0	0.00%
M5	0	0.00%
M6	0	0.00%
M7	3	0.60%
M8	0	0.00%
M9	6	1.20%
M10	0	0.00%
M11	2	0.40%
M12	0	0.00%
M13	0	0.00%
M14	2	0.40%
M15	1	0.20%
AD	0	0.00%
MP	1	0.20%
ON	0	0.00%
OP	2	0.40%
ES1	1	0.20%
ES2	1	0.20%
ES3	3	0.60%
ES4	0	0.00%
PR1	0	0.00%
PR2	0	0.00%
PR3	0	0.00%
PR4	2	0.40%
INN1	0	0.00%
INN2	0	0.00%

Variable	Frequency	Percent
INN3	1	0.20%
JS1	0	0.00%
JS2	2	0.40%
JS3	0	0.00%
OV1	0	0.00%
OV2	0	0.00%
OV3	1	0.20%
OV4	2	0.40%
OV5	0	0.00%
INV1	1	0.20%
INV2	2	0.40%
INV3	0	0.00%
INV4	0	0.00%
INS1	0	0.00%
INS2	0	0.00%
INS3	0	0.00%
INS4	4	0.80%
INS5	3	0.60%
CO1	0	0.00%
CO2	0	0.00%
CO3	1	0.20%
CO4	3	0.60%
CO5	0	0.00%
UN1	1	0.20%
UN2	0	0.00%
UN3	3	0.60%
UN4	2	0.40%
GENDER	0	0.00%
AGE	0	0.00%

EDUCATION	0	0.00%
TOTAL WORK	0	0.00%
CURRENT WORK	0	0.00%
IT USAGE	0	0.00%

Table 2. Missing data per case

***only cases with missing data are presented, the rest were 0%**

	CASEID	Percent
1	223258-223251-17367045	0.20%
2	223258-223251-17368761	0.20%
3	223258-223251-17370398	0.40%
4	223258-223251-17374601	0.20%
5	223258-223251-17399541	0.20%
6	223258-223251-17413407	0.20%
7	223258-223251-17471785	0.20%
8	223258-223251-17485289	0.40%
9	223258-223251-17488985	0.20%
10	223258-223251-17494107	0.20%
11	223258-223251-17496589	0.20%
12	223258-223251-17502188	0.20%
13	223258-223251-17488778	0.20%
14	223258-223251-17506655	0.20%
15	223258-223251-17518603	0.40%
16	223258-223251-17522941	0.20%
17	223258-223251-17525383	0.20%
18	223258-223251-17539418	0.20%
19	223258-223251-17551885	0.20%
20	223258-223251-17553420	0.20%
21	223258-223251-17563370	0.20%
22	223258-223251-17572427	0.40%
23	223258-223251-17619359	0.20%
24	223258-223251-17685004	0.20%

	CASEID	Percent
26	223258-223251-17708937	0.20%
27	223258-223251-17753019	0.20%
28	223258-223251-18060800	0.20%
29	223258-223251-18151457	0.20%
30	223258-223251-18157433	0.20%
31	223258-223251-18182792	0.20%
32	223258-223251-18249655	0.20%
33	223258-223251-18251044	0.20%
34	223258-223251-18276370	0.20%
35	223258-223251-18298269	0.20%
36	223258-223251-18602483	0.20%
37	223258-223251-18681132	0.20%
38	223258-223251-19661670	0.20%
39	223258-223251-19704957	0.20%
40	223258-223251-19705604	0.20%
41	223258-223251-19712896	0.20%
42	223258-223251-19713272	0.40%
43	223258-223251-19715555	0.40%
44	223258-223251-19792355	0.20%
45	223258-223251-19816229	0.20%
46	223258-223251-19818456	0.20%
47	223258-223251-19830645	0.20%
48	223258-223251-19885750	0.20%
49	223258-223251-20128468	0.20%

25	223258-223251-17687851	0.20%

50	223258-223251-20232175	0.20%
51	223258-223251-20295364	0.20%
52	223258-223251-20556130	0.20%

Table 3. MCAR Little's Test

Little's MCAR test: Chi-Square = 1703.538, DF = 1534, Sig. = .002

Table 4. T-test

		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11
M9	t	-.5	1.1	-2.6	-.7	-.1	.0	-1.6	-1.7		-2.2	.9
	df	5.1	5.0	5.3	5.1	5.1	5.0	5.2	5.5		5.2	5.1
	# Present	493	490	491	494	494	494	491	494	494	494	492
	# Missing	6	6	6	6	6	6	6	6	0	6	6
	Mean(Present)	4.59	4.70	4.01	3.72	4.14	3.14	4.00	4.11	4.26	4.19	3.18
	Mean(Missing)	4.83	4.00	4.83	4.17	4.17	3.17	4.67	4.50		5.00	2.67

M12	M13	M14	M15	AD	MP	ON	OP	PR1	PR2	PR3	PR4	INN1	INN2
-1.5	-2.1	-1.7	-.7	-3.5	-.6	-1.8	-1.6	-1.5	-1.9	-14.9	-.2	-1.7	-1.8
5.2	5.1	5.1	5.1	5.4	5.3	5.3	5.3	5.1	5.2	493.0	5.1	5.5	5.5
494	494	492	493	494	493	494	492	494	494	494	492	494	494
6	6	6	6	6	6	6	6	6	6	6	6	6	6
4.55	3.17	4.03	4.85	3.59	4.21	4.09	3.99	4.16	4.27	4.54	4.28	3.87	3.85
5.17	4.17	4.83	5.17	4.33	4.33	4.50	4.33	4.50	4.67	5.00	4.33	4.17	4.17

M12	M13	M14	M15	AD	MP	ON	OP	PR1	PR2	PR3	PR4	INN1	INN2
-1.5	-2.1	-1.7	-.7	-3.5	-.6	-1.8	-1.6	-1.5	-1.9	-14.9	-.2	-1.7	-1.8
5.2	5.1	5.1	5.1	5.4	5.3	5.3	5.3	5.1	5.2	493.0	5.1	5.5	5.5
494	494	492	493	494	493	494	492	494	494	494	492	494	494
6	6	6	6	6	6	6	6	6	6	6	6	6	6
4.55	3.17	4.03	4.85	3.59	4.21	4.09	3.99	4.16	4.27	4.54	4.28	3.87	3.85
5.17	4.17	4.83	5.17	4.33	4.33	4.50	4.33	4.50	4.67	5.00	4.33	4.17	4.17

INV3	INV4	INS1	INS2	INS3	INS4	INS5	CO1	CO2	CO3	CO4	CO5	UN1	UN2	UN3	UN4
-1.6	-1.4	-1.5	3.8	-.7	-.1	.1	.1	.4	.4	-.9	-.4	-1.5	.2	-.5	1.8
5.1	5.1	5.1	493.0	5.4	5.1	5.2	5.1	5.2	5.1	5.1	5.1	4.1	5.1	5.1	5.5
494	494	494	494	494	490	491	494	494	493	491	494	494	494	491	492
6	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6
2.59	2.27	2.35	3.16	2.51	1.95	2.53	2.06	1.96	3.34	2.67	1.96	3.51	3.42	2.92	3.14
3.50	3.17	3.00	3.00	2.67	2.00	2.50	2.00	1.83	3.17	3.00	2.17	4.00	3.33	3.17	2.83

Figure 1 . Univariate Outliers Boxplots

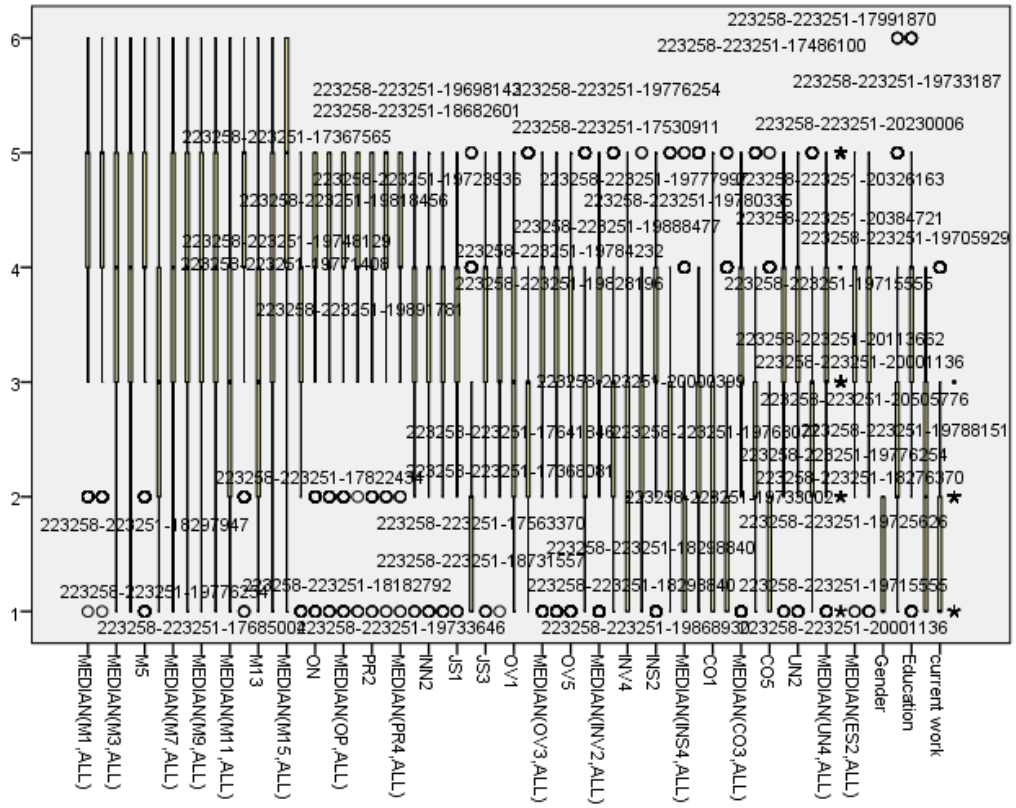

Table 5. Multivariate Outliers

Observation number	Mahalanobis d-squared	p1		Observation number	Mahalanobis d-squared	p1
74	90.112	0		96	40.958	0.006
84	85.993	0		381	40.953	0.006
168	81.762	0		105	40.873	0.006
48	79.021	0		185	40.496	0.006

53	70.43	0		19	39.703	0.008
115	69.491	0		424	38.821	0.01
172	68.278	0		282	38.776	0.01
234	66.187	0		173	38.579	0.011
206	61.864	0		270	38.505	0.011
195	60.067	0		266	38.367	0.012
179	57.583	0		378	38.237	0.012
72	55.948	0		14	37.751	0.014
9	54.292	0		39	37.666	0.014
122	51.616	0		175	37.618	0.014
182	50.775	0		113	37.514	0.015
80	50.715	0		184	37.042	0.017
358	50.031	0		275	36.612	0.019
18	49.273	0		129	36.557	0.019
225	47.224	0.001		37	36.549	0.019
106	46.396	0.001		190	36.276	0.02
150	46.162	0.001		50	36.204	0.021
46	46.111	0.001		132	36.172	0.021
274	45.933	0.001		60	36.057	0.022
138	44.658	0.002		31	35.705	0.024
271	43.329	0.003		408	35.416	0.025
292	42.763	0.003		418	35.114	0.027
177	42.263	0.004		38	34.801	0.03
367	42.14	0.004		235	34.564	0.032
87	42.102	0.004		107	34.236	0.034
147	42.079	0.004		146	34.192	0.035
8	41.535	0.005		117	33.573	0.04
111	41.207	0.005		142	33.553	0.04
				406	33.313	0.043
				336	33.311	0.043
				120	33.285	0.043
				337	33.195	0.044
				194	33.104	0.045
				20	33.023	0.046

Table 6. Bias

Variable	Groups	Means	Sig.	Variable	Groups	Means	Sig.
M1	1.00	4.30	.000	PR1	1.00	4.22	.013
	2.00	5.01			2.00	4.09	
M3	1.00	4.30	.000	PR2	1.00	4.21	.014
	2.00	3.64			2.00	4.37	
M4	1.00	3.51	.000	PR3	1.00	4.44	.000
	2.00	4.03			2.00	4.70	
M5	1.00	3.99	.000	PR4	1.00	4.19	.001
	2.00	4.37			2.00	4.40	
M9	1.00	4.00	.000	INN1	1.00	3.80	.020
	2.00	4.63			2.00	3.98	
M12	1.00	4.70	.002	INN2	1.00	3.73	.000
	2.00	4.36			2.00	4.03	
M13	1.00	3.31	.004	JS3	1.00	3.74	.000
	2.00	3.00			2.00	4.12	
AD	1.00	3.43	.000	OV1	1.00	3.17	.000
	2.00	3.83			2.00	2.75	
ON	1.00	3.91	.000	OV2	1.00	2.82	.011
	2.00	4.35			2.00	3.02	
MP	1.00	4.15	.024	OV3	1.00	3.29	.000
	2.00	4.30			2.00	4.15	
OP	1.00	3.82	.000	OV4	1.00	3.31	.000
	2.00	4.25			2.00	3.86	

Variable	Groups	Means	Sig.
OV5	1.00	3.16	.000
	2.00	3.75	

INV4	1.00	2.64	.000
	2.00	1.76	
INS2	1.00	3.05	.002
	2.00	3.31	
INS5	1.00	2.62	.012
	2.00	2.39	
CO1	1.00	2.20	.000
	2.00	1.86	
CO2	1.00	2.20	.000
	2.00	1.62	
CO3	1.00	3.07	.000
	2.00	3.74	
CO4	1.00	2.76	.007
	2.00	2.53	
CO5	1.00	2.17	.000
	2.00	1.67	
UN2	1.00	3.24	.000
	2.00	3.67	
UN3	1.00	2.74	.000
	2.00	3.19	
ES2	1.00	3.82	.003
	2.00	3.64	
ES3	1.00	3.66	.000
	2.00	3.91	
ES4	1.00	3.51	.001
	2.00	3.34	

Normality

Table 7. Univariate Normality

Items	Mean	St. deviation	Skewness	Kurtosis
M1	4.598	1.1166	-0.59	-0.458
M2	4.694	0.981	-0.929	0.862
M3	4.022	1.1296	-0.236	-0.579
M4	3.72	1.25	-0.171	-0.637
M5	4.14	1.178	-0.491	-0.02
M6	3.14	1.246	0.197	-0.438
M7	4.012	1.1552	-0.438	-0.397
M8	4.12	1.123	-0.332	-0.419
M9	4.256	1.2171	-0.333	-0.463
M10	4.2	1.1343	-0.473	-0.34
M11	3.176	1.1661	0.43	-0.235
M12	4.56	1.207	-0.61	-0.434
M13	3.18	1.181	0.346	-0.161
M14	4.038	1.1727	-0.396	-0.345
M15	4.856	1.2109	-1.027	0.341
AD	3.59	0.876	-0.784	0.695
ON	4.09	0.892	-1.13	1.511
OP	3.996	0.8303	-0.899	1.352
MP	4.21	0.7714	-1.3	3.011
ES1	3.932	0.6873	-0.916	2.539
ES2	3.75	0.6666	-0.4	0.813
ES3	3.76	0.748	-0.875	1.485
ES4	3.44	0.5857	0.655	0.208
PR1	4.168	0.5971	-0.813	4.121
PR2	4.272	0.7232	-1.133	2.432
PR3	4.544	0.6848	-1.719	3.767
PR4	4.276	0.6847	-0.829	1.487
INN1	3.87	0.83	-0.432	0.02
INN2	3.86	0.844	-0.605	0.533

INN3	3.706	0.8468	-0.294	0.104
JS1	3.73	0.77	-1.066	1.315
JS2	3.896	0.85243	0.81	0.354
JS3	3.968	0.90144	-0.677	0.415
OV1	3.002	0.9757	-0.017	-0.08
OV2	2.9	0.874	0.087	-0.045
OV3	3.638	1.1034	-0.64	-0.44
OV4	3.534	0.9437	-0.874	0.392
OV5	3.398	1.0048	-0.54	-0.47
INV1	2.59	1.0237	0.493	-0.484
INV2	3.148	1.0355	-0.212	-0.321
INV3	2.6	0.96	0.21	-0.38
INV4	2.28	1.153	0.652	-0.536
INS1	2.36	0.86	0.519	-0.184
INS2	3.16	0.917	-0.376	-0.117
INS3	2.52	0.94	0.302	-0.47
INS4	1.95	0.8251	0.845	0.811
INS5	2.526	0.9936	0.457	-0.142
CO1	2.06	0.979	0.78	-0.107
CO2	1.96	0.959	0.914	0.267
CO3	3.342	1.0174	-0.598	-0.387
CO4	2.67	0.9332	0.523	-0.264
CO5	1.97	0.942	0.805	-0.063
UN1	3.514	0.7944	-0.564	0.332
UN2	3.42	0.82	-0.819	0.206
UN3	2.924	0.867	-0.149	-0.21
UN4	3.134	0.847	-0.159	0.126

Table 8. Kolmogorov-Smirnov and Shapiro-Wilk Tests

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
M1	.267	500	.000	.876	500	.000
M2	.298	500	.000	.847	500	.000

M3	.183	500	.000	.920	500	.000
M4	.189	500	.000	.931	500	.000
M5	.206	500	.000	.914	500	.000
M6	.193	500	.000	.931	500	.000
M7	.204	500	.000	.910	500	.000
M8	.194	500	.000	.917	500	.000
M9	.173	500	.000	.919	500	.000
M10	.228	500	.000	.905	500	.000
M11	.228	500	.000	.916	500	.000
M12	.237	500	.000	.886	500	.000
M13	.219	500	.000	.923	500	.000
M14	.198	500	.000	.916	500	.000
M15	.251	500	.000	.829	500	.000
AD	.305	500	.000	.842	500	.000
ON	.274	500	.000	.805	500	.000
MP	.283	500	.000	.758	500	.000
OP	.286	500	.000	.823	500	.000
PR1	.355	500	.000	.705	500	.000
PR2	.257	500	.000	.760	500	.000
PR3	.377	500	.000	.665	500	.000
PR4	.265	500	.000	.772	500	.000
INN1	.255	500	.000	.858	500	.000
INN2	.270	500	.000	.853	500	.000
INN3	.232	500	.000	.865	500	.000
JS1	.383	500	.000	.756	500	.000
JS2	.280	500	.000	.836	500	.000
JS3	.285	500	.000	.847	500	.000
ES4	.368	500	.000	.708	500	.000
OV1	.195	500	.000	.892	500	.000
OV2	.236	500	.000	.887	500	.000
OV3	.281	500	.000	.864	500	.000
OV4	.325	500	.000	.828	500	.000
OV5	.291	500	.000	.863	500	.000
INV1	.276	500	.000	.876	500	.000
INV2	.209	500	.000	.907	500	.000
INV3	.207	500	.000	.900	500	.000
INV4	.250	500	.000	.862	500	.000
INS1	.307	500	.000	.848	500	.000
INS2	.220	500	.000	.885	500	.000
INS3	.246	500	.000	.888	500	.000
INS4	.282	500	.000	.821	500	.000
INS5	.234	500	.000	.892	500	.000

CO1	.270	500	.000	.836	500	.000
CO2	.257	500	.000	.823	500	.000
CO3	.287	500	.000	.861	500	.000
CO4	.268	500	.000	.868	500	.000
CO5	.252	500	.000	.828	500	.000
UN1	.294	500	.000	.842	500	.000
UN2	.317	500	.000	.808	500	.000
UN3	.243	500	.000	.884	500	.000
UN4	.245	500	.000	.878	500	.000
ES1	.351	500	.000	.766	500	.000
ES2	.328	500	.000	.799	500	.000
ES3	.348	500	.000	.796	500	.000
Gender	.353	500	.000	.636	500	.000
Age	.295	500	.000	.855	500	.000
Education	.215	500	.000	.880	500	.000
Total work	.216	500	.000	.851	500	.000
current work	.340	500	.000	.724	500	.000
it usage	.492	500	.000	.477	500	.000

a. Lilliefors Significance Correction

Table 9. Multivariate Normality

Variable	min	max	skew	C.R.	kurtosis	C.R.
MAAS3	1.4	5.6	-0.608	-5.548	0.58	2.647
MAAS2	1.6	5.8	-0.185	-1.688	-0.115	-0.526
MAAS1	2	6	-0.568	-5.182	0.07	0.32
ictinnovat	1	5	-0.511	-4.667	0.78	3.562
ictproduct	1	5	-1.36	-12.418	5.357	24.453
overload	1	5	-0.7	-6.393	0.6	2.738
invasion	1	5	0.465	4.244	0.282	1.287
insecurity	1	5	0.157	1.434	0.16	0.729
complexity	1	4.8	0.579	5.282	0.141	0.643
uncertainty	1	5	-0.446	-4.076	0.827	3.775
OP	1	5	-0.897	-8.186	1.326	6.054
ON	1	5	-1.127	-10.286	1.484	6.774
MP	1	5	-1.297	-11.836	2.969	13.552
AD	1	5	-0.782	-7.135	0.677	3.088
ES4	1	5	0.653	5.962	0.194	0.887
ES3	1	5	-0.873	-7.966	1.458	6.656

ES2	1	5	-0.399	-3.639	0.793	3.619
ES1	1	5	-0.913	-8.336	2.502	11.42
JS3	1	5	-0.675	-6.158	0.399	1.821
JS2r	1	5	-0.808	-7.376	0.338	1.544
JS1	1	5	-1.063	-9.706	1.29	5.888
Multivariate					112.663	**40.527**

Tables 10-17. Linearity

Model Summary and Parameter Estimates

Dependent Variable: job satisfaction

Equation	Model Summary				
	R Square	F	df1	df2	Sig.
Linear	.212	134.231	1	498	.000
Logarithmic[a]	.	.	.	.	.
Inverse	.005	2.390	1	498	.123
Quadratic	.224	71.755	2	497	.000
Cubic	.225	48.090	3	496	.000
Compound	.200	124.860	1	498	.000
Power[a]	.	.	.	.	.
S	.003	1.481	1	498	.224
Growth	.200	124.860	1	498	.000
Exponential	.200	124.860	1	498	.000
Logistic	.200	124.860	1	498	.000

The independent variable is technostress.

Model Summary and Parameter Estimates

Dependent Variable: end user performance

Equation	Model Summary				
	R Square	F	df1	df2	Sig.
Linear	.238	155.212	1	498	.000
Logarithmic	.	.	.	.	.
Inverse	.006	3.237	1	498	.073
Quadratic	.243	79.891	2	497	.000
Cubic	.262	58.733	3	496	.000
Compound	.230	149.160	1	498	.000
Power	.	.	.	.	.
S	.004	2.018	1	498	.156
Growth	.230	149.160	1	498	.000
Exponential	.230	149.160	1	498	.000
Logistic	.230	149.160	1	498	.000

The independent variable is technostress

Dependent Variable: end user satisfaction

Equation	Model Summary				
	R Square	F	df1	df2	Sig.
Linear	.169	101.368	1	498	.000
Logarithmic[a]	.	.	.	.	.
Inverse	.008	3.931	1	498	.048
Quadratic	.169	50.610	2	497	.000
Cubic	.195	40.111	3	496	.000
Compound	.172	103.558	1	498	.000
Power[a]	.	.	.	.	.
S	.005	2.618	1	498	.106
Growth	.172	103.558	1	498	.000
Exponential	.172	103.558	1	498	.000
Logistic	.172	103.558	1	498	.000

The independent variable is technostress.

Model Summary and Parameter Estimates

The independent variable is mindfulness.

Dependent Variable: technostress.

Equation	Model Summary				
	R Square	F	df1	df2	Sig.

Linear	.077	41.777	1	498	.000
Logarithmic	.080	43.234	1	498	.000
Inverse	.082	44.330	1	498	.000
Quadratic	.078	21.122	2	497	.000
Cubic	.087	15.656	3	496	.000
Logistic[a]	.	.	.	.	.

Model Summary and Parameter Estimates

The independent variable is mindfulness.

Dependent Variable: technostress.

Equation	Model Summary				
	R Square	F	df1	df2	Sig.
Linear	.077	41.777	1	498	.000
Logarithmic	.080	43.234	1	498	.000
Inverse	.082	44.330	1	498	.000
Quadratic	.078	21.122	2	497	.000
Cubic	.087	15.656	3	496	.000
Logistic[a]	.	.	.	.	.

Model Summary and Parameter Estimates

Dependent Variable: technostress. The independent variable is IT mindfulness.

Equation	Model Summary				
	R Square	F	df1	df2	Sig.
Linear	.165	98.318	1	498	.000
Logarithmic	.164	98.026	1	498	.000
Inverse	.144	83.686	1	498	.000
Quadratic	.166	49.311	2	497	.000
Cubic	.168	33.285	3	496	.000
Logistic[a]	.	.	.	.	.

Dependent Variable: end user satisfaction

Equation	Model Summary				
	R Square	F	df1	df2	Sig.
Linear	.354	272.450	1	498	.000
Logarithmic	.339	255.968	1	498	.000
Inverse	.281	195.082	1	498	.000
Quadratic	.354	136.114	2	497	.000
Cubic	.363	94.204	3	496	.000
Compound	.346	263.589	1	498	.000
Power	.357	276.538	1	498	.000
S	.330	245.666	1	498	.000
Growth	.346	263.589	1	498	.000
Exponential	.346	263.589	1	498	.000
Logistic	.346	263.589	1	498	.000

The independent variable is IT mindfulness.

Model Summary and Parameter Estimates

Dependent Variable: end user performance. The independent variable is end user satisfaction.

Equation	Model Summary				
	R Square	F	df1	df2	Sig.
Linear	.606	766.307	1	498	.000
Logarithmic	.599	743.882	1	498	.000
Inverse	.539	582.666	1	498	.000
Quadratic	.607	384.612	2	497	.000
Cubic	.608	255.918	3	496	.000
Compound	.560	633.279	1	498	.000
Power	.596	734.418	1	498	.000
S	.598	739.924	1	498	.000
Growth	.560	633.279	1	498	.000
Exponential	.560	633.279	1	498	.000
Logistic	.560	633.279	1	498	.000

Tables 18 – 21. Multicollinearity

Coefficients, Dependent Variable: end user performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF

1	(Constant)	1.009	.079		12.828	.000		
	technostress	-.165	.028	-.146	-5.905	.000	.797	1.254
	ITmin	.404	.013	.769	31.672	.000	.823	1.215
	mindful	.060	.013	.105	4.564	.000	.909	1.100

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.974	.159		12.394	.000		
	technostress	-.280	.057	-.195	-4.956	.000	.797	1.254
	ITmin	.339	.026	.507	13.121	.000	.823	1.215
	mindful	.027	.026	.038	1.023	.307	.909	1.100

Dependent Variable: end user satisfaction

Coefficients. Dependent Variable: job satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.950	.229		12.897	.000		
	techno	-.716	.081	-.387	-8.814	.000	.797	1.254
	ITmin	.083	.037	.097	2.236	.026	.823	1.215
	mindful	.114	.038	.123	2.994	.003	.909	1.100

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.904	.093		20.467	.000		
	ITmin	-.168	.019	-.363	-8.838	.000	.953	1.050
	mindful	-.099	.020	-.199	-4.855	.000	.953	1.050

a. Dependent Variable: technostress

Table 22. Homoscedasticity

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
End performance	4.543	1	498	.034

technostress	1.596	1	498	.207
End user satisfaction	4.195	1	498	.041
Job satisfaction	1.111	1	498	.292

Table 23. Reliability

	Items	Cronbach alpha
Mindfulness	15	0.843
IT Mindfulness	4	0.855
Job Satisfaction	3	0.796
End user satisfaction	4	0.791
End user performance	7	0.849
technostress	23	0.846

Tables 24 – 41. Unidimensionality

Technostress

Communalities

	Initial	Extraction
overload	1.000	.499
invasion	1.000	.512
insecurity	1.000	.500
complexity	1.000	.387
uncertainty	1.000	.165

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.063	41.259	41.259	2.063	41.259	41.259
2	.987	19.741	60.999			
3	.821	16.413	77.412			
4	.588	11.763	89.175			
5	.541	10.825	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
overload	.706
invasion	.715
insecurity	.707
complexity	.622
uncertainty	.406

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Mindfulness

Communalities

	Initial	Extraction
MAAS1	1.000	.773
MAAS2	1.000	.785
MAAS3	1.000	.746

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.304	76.815	76.815	2.304	76.815	76.815
2	.377	12.560	89.375			
3	.319	10.625	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
MAAS1	.879
MAAS2	.886
MAAS3	.864

Extraction Method: Principal Component Analysis.

IT Mindfulness

Communalities

	Initial	Extraction

AD	1.000	.666
ON	1.000	.775
MP	1.000	.626
OP	1.000	.725

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.792	69.801	69.801	2.792	69.801	69.801
2	.510	12.755	82.556			
3	.393	9.826	92.382			
4	.305	7.618	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix

	Component
AD	.816
ON	.881
MP	.791
OP	.851

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

End user performance

Communalities

	Initial	Extraction
Ict productivity	1.000	.753
Ict innovation	1.000	.753

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.506	75.304	75.304	1.506	75.304	75.304
2	.494	24.696	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
ict productivity	.868
Ict innovation	.868

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Job Satisfaction

Communalities

	Initial	Extraction
JS1	1.000	.730
JS2	1.000	.681
JS3	1.000	.730

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.141	71.357	71.357	2.141	71.357	71.357
2	.468	15.587	86.944			
3	.392	13.056	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix

	Component
	1
JS1	.854
JS2	-.825
JS3	.854

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

End user satisfaction

Communalities

	Initial	Extraction
ES1	1.000	.569
ES2	1.000	.686
ES3	1.000	.682
ES4	1.000	.526

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.463	61.576	61.576	2.463	61.576	61.576
2	.673	16.833	78.409			
3	.437	10.915	89.324			
4	.427	10.676	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix

	Component
	1
ES1	.754
ES2	.828
ES3	.826
ES4	.725

Extraction Method: Principal Component Analysis.

Table 42. Harman's single factor

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.892	14.342	14.342	8.892	14.342	14.342
2	5.103	8.230	22.572			
3	4.605	7.427	29.999			
4	3.444	5.555	35.554			
5	2.639	4.257	39.811			
6	2.390	3.855	43.667			
7	1.920	3.096	46.763			
8	1.742	2.809	49.573			
9	1.680	2.709	52.282			
10	1.494	2.409	54.691			

11	1.314	2.119	56.810				
12	1.222	1.971	58.781				
13	1.148	1.851	60.632				
14	1.141	1.840	62.472				
15	1.035	1.669	64.142				
16	1.026	1.656	65.797				
17	.930	1.500	67.297				
18	.908	1.465	68.763				
19	.869	1.402	70.164				
20	.830	1.339	71.503				
21	.817	1.318	72.822				
22	.783	1.263	74.085				
23	.713	1.149	75.235				
24	.690	1.113	76.347				
25	.668	1.078	77.425				
26	.629	1.015	78.439				
27	.599	.966	79.405				
28	.587	.947	80.353				
29	.574	.926	81.278				
30	.556	.897	82.176				
31	.545	.879	83.055				
32	.527	.849	83.904				
33	.494	.797	84.701				
34	.487	.786	85.487				
35	.475	.766	86.252				
36	.466	.751	87.003				
37	.453	.731	87.734				
38	.441	.711	88.446				
39	.424	.685	89.130				
40	.400	.645	89.776				
41	.396	.639	90.414				
42	.381	.614	91.028				
43	.371	.599	91.627				
44	.363	.585	92.212				
45	.353	.569	92.781				
46	.337	.544	93.325				
47	.323	.521	93.846				
48	.317	.512	94.357				
49	.311	.502	94.860				
50	.305	.492	95.351				
51	.295	.476	95.827				

52	.284	.458	96.285			
53	.280	.452	96.737			
54	.276	.445	97.182			
55	.251	.405	97.586			
56	.245	.395	97.981			
57	.240	.388	98.369			
58	.232	.374	98.743			
59	.214	.345	99.088			
60	.209	.336	99.424			
61	.182	.294	99.718			
62	.175	.282	100.000			

Extraction Method: Principal Component Analysis.

Appendix E

Complete case (listwise) SEM analysis - structural model path coefficients

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
techno	<---	mindful	-.040	.017	-2.360	.018	
techno	<---	ITmin	-.146	.036	-4.029	***	
endusersatisfaction	<---	ITmin	.286	.051	5.608	***	
endusersatisfaction	<---	techno	-.607	.229	-2.650	.008	
endperformance	<---	endusersatisfaction	.487	.065	7.471	***	
jobsatis	<---	mindful	.119	.051	2.329	.020	
jobsatis	<---	techno	-1.105	.315	-3.507	***	
endperformance	<---	techno	-.681	.207	-3.286	.001	
JS1	<---	jobsatis	1.000				
JS2r	<---	jobsatis	1.122	.087	12.854	***	
JS3	<---	jobsatis	1.208	.091	13.278	***	
ES1	<---	endusersatisfaction	1.000				
ES2	<---	endusersatisfaction	1.082	.090	11.994	***	
ES3	<---	endusersatisfaction	1.348	.107	12.591	***	
ES4	<---	endusersatisfaction	.786	.076	10.344	***	
AD	<---	ITmin	1.000				
MP	<---	ITmin	.797	.058	13.698	***	
ON	<---	ITmin	1.141	.068	16.694	***	
OP	<---	ITmin	1.039	.065	16.021	***	
complexity	<---	techno	3.453	.802	4.303	***	
insecurity	<---	techno	1.888	.456	4.143	***	
invasion	<---	techno	1.505	.335	4.487	***	
overload	<---	techno	1.000				
ictproduct	<---	endperformance	1.000				
ictinnovat	<---	endperformance	1.351	.129	10.460	***	
MAAS1	<---	mindful	1.000				
MAAS2	<---	mindful	.961	.057	16.830	***	
MAAS3	<---	mindful	.852	.053	16.132	***	

Complete case analysis - structural model fit indices

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	50	503.530	160	.000	3.147
Saturated model	210	.000	0		
Independence model	20	3511.790	190	.000	18.483

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.041	.894	.861	.681
Saturated model	.000	1.000		
Independence model	.146	.423	.362	.383

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.857	.830	.898	.877	.897
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.842	.721	.755
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000