2019

Relationship Between Technostress Dimensions and Employee Productivity

Kesha Walton
Walden University

Walden University

College of Management and Technology

This is to certify that the doctoral study by

Kesha T. Walton

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee

Dr. Diane Dusick, Committee Chairperson, Doctor of Business Administration Faculty

Dr. James Glenn, Committee Member, Doctor of Business Administration Faculty

Dr. Janie Mayo, University Reviewer, Doctor of Business Administration Faculty

The Office of the Provost

Walden University
2019

Abstract

Relationship Between Technostress Dimensions and Employee Productivity

by

Kesha T. Walton

MBA-TM, University of Phoenix, 2007

BS, University of North Florida, 1996

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

December 2019

Abstract

Low productivity among employees represents a threat to the sustainability of organizational profits. Retail organizations have experienced a loss of over $300 billion annually because of low productivity. A consequence of technostress is low self-efficacy, which promotes low productivity and high employee absenteeism and burnout. Guided by the theory of technological self-efficacy, the purpose of this correlational study was to examine whether a relationship existed between employee technostress and employee productivity and the extent that technological self-efficacy mediated that relationship. A random sample of 112 retail employees from central Florida contributed to this study. Data were analyzed using Pearson bivariate correlations and multiple linear regression. The overall predictor variables of technostress and technological self-efficacy accounted for approximately 12% of variance in employee productivity. The results in this study indicated the overall linear regression model was significant. Bivariate findings indicated that technostress was not significantly associated with employee productivity. Technological self-efficacy was significantly associated with employee productivity. As employees' technological self-efficacy increased, so did their productivity. The results of this study supported the conclusion that business professionals may benefit from implementing newer IT systems to improve profits and creating mentorships to train employees. The implications of this study for positive social change included the potential to break the cycle of stress-related issues and provide a quality work life for employees.

Relationship Between Technostress Dimensions and Employee Productivity

by

Kesha T. Walton

MBA-TM, University of Phoenix, 2007

BS, University of North Florida, 1996

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

December 2019

Dedication

I dedicate my dissertation to God, family, and close friends. First, I thank God for the ability to presevere through obstacles. Second, to my husband, who says this is his degree. To my daughter, Kesjah Walton, who gave my life substance and encouragement to finish and my sons, Jameson, James, Jr., and Ka'male, who stated I was a student for life! Lastly, to my traveling buddy, Kim Johnson and to my number one motivator, Katrina Wilkins-Jackson, PhD, for the endless talks, I am forever grateful!

Acknowledgments

I acknowldege my mentor, Dr. Diane Dusick, for her dedication and support whether through text, phone, or Skype. I am also grateful for Dr. James Glenn and Dr. Janie Mayo for their invaluable service on my disseration committee. With humility, I acknowledge my parents, Maurice and Betty Williams, who nurtured me into a life learner. Without their love and enless devotion, I would have never aspire to dream so big! Lastly, I would like to acknowledge my brother Marcus for just being himself!

Table of Contents

List of Tables iv

List of Figures v

Section 1: Foundation of the Study 1

Background of the Problem 1

Problem Statement 2

Purpose Statement 3

Nature of the Study 3

Research Question 5

Hypotheses 5

Theoretical Framework 5

Operational Definitions 6

Assumptions, Limitations, and Delimitation 7

Assumptions 7

Limitations 10

Delimitations 11

Significance of the Study 12

Contribution to Business Practice 12

Implications for Social Change 12

A Review of the Professional and Academic Literature 13

Theory of Self-Efficacy 14

General Self-Efficacy in Business Technology 22

Predictors of General Self-Efficacy 26
Outcomes of General Self-Efficacy 28
Technological Self-Efficacy 29
Technostress 31
Technostress and Employee Productivity 34
Technostress and Technological Self-Efficacy 39
Outcomes of Technostress in Information Technology 43
Summary and Transition 45
Section 2: The Project 49
Purpose Statement 49
Role of the Researcher 50
Participants 51
Research Method and Design 53
Research Method 53
Research Design 54
Population and Sampling 55
Ethical Research 59
Data Collection Instruments 60
Data Collection Technique 65
Data Analysis 68
Study Validity 76
Summary and Transition 81

Section 3: Application to Professional Practice and Implications for Change 82

Introduction 82

Presentation of the Findings 82

Applications to Professional Practice 98

Implications for Social Change 100

Recommendations for Action 100

Recommendations for Further Research 102

Reflections 103

Conclusion 105

References 107

Appendix A: Instrument Information Technology Works 140

Appendix B: Request to Use Technological Complexity Scale, Technological Self-Efficacy Scale, and Employee Productivity Scale 141

Appendix C: Permission to Use Technological Complexity Scale, Technological Self-Efficacy Scale, and Employee Productivity Scale 142

Appendix D: Survey Scales for Generalized Self-Efficacy 143

Appendix E: Survey Scales for Employee Productivity 144

List of Tables

Table 1. Frequencies and Percentages: Work Information (N = 112) 84

Table 2. Descriptive Statistics: Study Variables (N = 112) 85

Table 3. Point Biserial Correlations: Numbers of Years in the Retail Industry and Technostress, Technological Self-Efficacy, and Employee Productivity (N = 112) 89

Table 4. $Z_{skewness}$ Values: Study Variable Normality (N = 112) 90

Table 5. Variance Inflation Factors (VIFs): Lack of Multicollinearity Among Study Variables (N = 112) 96

Table 6. Pearson Bivariate Correlations: Technostress, Technological Self-efficacy, and Employee Productivity 97

Table 7. Technostress and Technological Self-Efficacy Predicting Employee Productivity 98

List of Figures

Figure 1. Path model of technological self-efficacy effects on employee productivity 6

Figure 2. Histogram: Technostress scores 86

Figure 3. Histogram: Technological self-efficacy scores 87

Figure 4. Histogram: Employee productivity scores 88

Figure 5. Scatterplot: Technostress and work productivity 92

Figure 6. Scatterplot: Technostress and technological self-efficacy 92

Figure 7. Scatterplot: Technological self-efficacy and work productivity 93

Figure 8. P-P plot: Technostress and work productivity.....94

Figure 9. P-P plot: Technostress and technological self-efficacy.....94

Figure 10. P-P plot: Technological self-efficacy and work productivity.....95

Section 1: Foundation of the Study

A technologically savvy and committed workforce is vital in the increasingly customer-centric retail industry, where customers demand technology-driven shopping experiences with a human touch (Accenture, 2017; Blitz, 2016; Grewal, Roggeveen, & Nordfält, 2017). Innovative information and communications technologies (ICTs) can be a powerful tool that allows retail associates to be more knowledgeable, active, accessible to shoppers, and ultimately more productive (Notomi, Tsukamoto, Kimura, & Yamamoto, 2015; Pantano, 2014). *Technostress* is a form of stress connected to the problem of adaptation, in which individuals are unable to cope with requirements related to the use of technology (Blitz, 2016; Tarafdar, Pullins, & Ragu-Nathan, 2014b). However, a review of literature revealed limited information about the effects of technostress, technology self-efficacy, and employee productivity in the retail workforce (Hristov & Reynolds, 2015; Pederzoli, 2016; Tarafdar, Pullins, & Ragu-Nathan, 2014a). The purpose of this quantitative correlational study was to determine if employee technostress had an association with employee productivity and whether technology self-efficacy mediated this relationship.

Background of the Problem

Technostress is a type of work strain resulting from an inability to manage effectively and cope with ICT-work-related practices and procedures (Tarafdar et al., 2014a). The retail sector in America employs almost 16 million people, 10.8% of the overall American workforce, and accounts for approximately two-thirds of the American gross domestic product (GDP; Aspen Institute, 2017). The digital revolution dramatically transformed the American retail industry, and innovative ICTs played a key role in the

success, if not the survival, of retail businesses (Grewal et al., 2017; Pantano & Viassone, 2015). ICTs, including bots (computer program without human intervention), automated processes, and machine learning, streamlined retail supply-chain logistics and optimized distribution and inventory, resulting in increased productivity and efficiencies (Grewal et al., 2017; Pantano & Viassone, 2015). ICTs had also profoundly changed the landscape of customer service to align with the consumer-centric approach valued by customers (Notomi et al., 2015).

Work-related limitations can compound frontline retail employees' inefficient use of ICTs. The majority (> 65%) of frontline retail staff had a high school diploma or equivalent, while one-fourth had less than a high school education (Hristov & Reynolds, 2015). Almost three-fourths of retail workers had very poor digital problem-solving skills (Bata, Pentina, Tarafdar, & Pullins, 2018). Because of these limitations, retail employees were more prone to exhibit low technology self-efficacy and develop technostress (Tarafdar, D'Arcy, Turel, & Gupta, 2015; Tarafdar et al., 2014a; Tarafdar, Tu, & Ragu-Nathan, 2010). Low technology self-efficacy and technostress resulted in low employee productivity, which can ultimately affect the corporation's bottom line (Tarafdar et al., 2015).

Problem Statement

Low productivity erodes organizational profits (Tarafdar et al., 2015; Tarafdar et al., 2014b). Organizational leaders lost over $300 billion annually in revenue due to in part to low productivity (Köffer, Ortbach, & Niehaves, 2014). The general business problem was that employees with low productivity negatively impacted overall

profitability. The specific business problem was that some retail supply-chain managers did not know whether a relationship existed between employee technostress and employee productivity, and if so, if the relationship could be mediated by technological self-efficacy.

Purpose Statement

The purpose of this quantitative correlational study was to determine whether a relationship existed between retail employee technostress and employee productivity, and if so, whether technological self-efficacy mediated the relationship. Participants were a representative random sample of 112 retail front line staff from approximately 10 different retail stores in central Florida. Tarafdar, Tu, Ragu-Nathan, and Ragu-Nathan's (2007) technological complexity scale was used to assess technostress, the independent variable. The dependent variable in this study was employee productivity, as measured using Tarafdar et al.'s (2007) ICT-related employee productivity scale. This study included a mediating variable, technological self-efficacy, assessed using Tarafdar et al.'s (2007) technological insecurity scale. The implications for positive social change included the potential to break the cycle of stress-related issues and provide a quality work life for employees. A positive work environment can contribute to job retention, which in turn can contribute to a healthy local economy.

Nature of the Study

A quantitative methodology was appropriate for this study. Researchers apply quantitative research methodology to examine and predict the behaviors and preferences of large populations, using the data to test hypotheses (Babbie, 2015). The quantitative

method was appropriate because the purpose of this study was to examine whether technological self-efficacy mediated the relationship between technostress and employee productivity in retail supply-chain organizations. In contrast, researchers employ qualitative methodologies to seek an understanding of the *how, why,* and *what* of participants' experiences with a phenomenon rather than to explain the factors related to a phenomenon (Lucero et al., 2018). Therefore, the qualitative method was not an appropriate method for this study. Mixed methods studies are a combination of qualitative and quantitative methods (Venkatesh, Brown, & Sullivan, 2016). No qualitative analysis was necessary to examine a relationship or test a mediator; therefore, a mixed methodology was not appropriate in this case.

Quantitative researchers use a correlational design to examine the nature and extent of a relationship between two or more variables (Asamoah, 2014). A correlational design was appropriate for this study because of the potential for understanding the relationship between a predictor variable (technostress), a mediating variable (technological self-efficacy), and the dependent variable (employee productivity). Other designs, such as quasi-experimental and experimental designs, are appropriate for researchers who seek to determine causal relationships between variables (Lucero et al., 2018). However, the purpose of this study was not to introduce a change and then monitor the effects; thus, the quasi-experimental and experimental designs were not appropriate. Certain statistical approaches, such as linear and logistic regression, path analysis, and structural equation modeling, are appropriate for correlational studies (Tabachnick & Fidell, 2014). I used hierarchical linear regression (HLR) for mediation to

test study hypotheses in accordance with the recommendations of Baron and Kenny (1986).

Research Question

One primary research question guided this study: Is there a relationship between employee technostress and employee productivity, and if so, is this relationship mediated by technological self-efficacy?

Hypotheses

$H1_0$: Technological self-efficacy does not mediate the relationship between supply chain managers' technostress and employee productivity.

$H1_A$: Technological self-efficacy mediates the relationship between supply chain managers' technostress and employee productivity.

Theoretical Framework

Learning is a key aspect of Bandura's (1977) social learning theory (SLT). Its central premise is *reciprocal determinism*, the idea that learning (behavior) is a result of people's interactions with their environment (Bandura, 1977). Unlike behaviorists, who regard learning as a response to stimuli in the environment, Bandura posited in his SLT that learning is a dynamic process influenced by active cognitive processes (e.g., attention, memory, motivation), which shape how an individual perceives his/her environment and responds (behaves) in reaction to that perception.

Bandura (1977) asserted that self-efficacy, a cognitive component of the individual, can greatly influence behavior. Self-efficacy pertains to an individual's belief in his/her ability to perform a particular behavior. Self-efficacy is a task-specific esteem,

and an individual might have high self-efficacy in one domain (e.g., academics) and low self-efficacy in another domain (e.g., sports). Bandura (1977) identified four primary sources of self-efficacy: (a) past experiences of performance, (b) vicarious reinforcement, (c) social persuasion, and (d) physiological and emotional states (Figure 1).

Technostress is stress that results from the use of ICTs in an organizational context (Tarafdar et al., 2014b; Tarafdar et al., 2007). Within the context of Bandura's self-efficacy theory, technostress best relates to physiological and emotional states, as stress activates the central nervous and endocrine systems (Tarafdar et al., 2014a). Technostress is also related to an individual's prior performance using ICTs, observations of others' use of ICTs, and the social persuasion aspect of training. The individual's perception of ICTs, including ease of use, the reliability of functioning, and degree of complexity, can in turn influence an individual's technological self-efficacy (Tarafdar et al., 2014a). The behavior under examination in this study was employee productivity, as indirectly influenced by technostress through the mediator of technological self-efficacy.

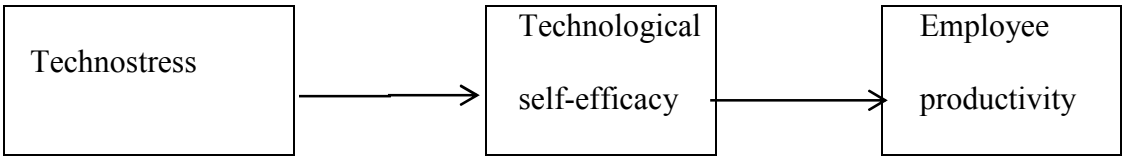

Figure 1. Path model of technological self-efficacy effects on employee productivity.

Operational Definitions

Employee productivity: The assessment measure of competencies of employees' competencies and their evaluation of outputs (Shin & Eksioglu, 2015).

Information and computer technology (ICT): The technological application of computers and telecommunication equipment to store, transmit, retrieve, and manipulate data within the context of business networks (Hsia, Chang, & Tseng, 2014).

Radio frequency identification (RFID): A wireless technology device capable of identifying and tracking items by using radio waves (Cui, Wang, & Deng, 2014).

Supply-chain management (SCM): The management process of good and services; SCM involves the flow and storage of materials, inventory, and goods from the point of origin to the point of consumption (Corominas, Mateo, Ribas, & Rubio, 2015).

Technostress: The overexposure or involvement with a feeling of anxiety or mental pressure when working with computer technology daily (Tarafdar et al., 2014a).

Technocomplexity: The implicit quality of ICTs that causes employees to exhibit incompetency at navigating the constant changes in technology (Tarafdar et al., 2014b).

Technological self-efficacy: A person's belief in their ability to perform a technical task successfully (Tallodi, 2015).

Assumptions, Limitations, and Delimitation

Assumptions

Simon and Goes (2013) defined assumptions in research studies as aspects of the study that researchers assume to be true. Quantitative studies commonly feature paradigmatic, methodological, and statistical assumptions (Babbie, 2015). The positivist paradigm of quantitative research contains assumptions regarding the nature of reality (ontology), knowledge (epistemology), and values in research (axiology; Babbie, 2015;

Simon & Goes, 2013). The positivist ontological assumptions are that a single reality exists external to the researcher and that the study constructs can be operationally defined and measured. In alignment with the positivist epistemological assumption, I posited that the use of deductive reasoning through the scientific method would provide objective and true results. I followed the positivist axiological assumption that value-free results might be achieved using ethical research practices (e.g., honesty, the absence of bias, admission of study limitations).

Assumptions in quantitative studies pertain to the guiding theory, relevance of the study, study participants, and instrument data and statistics (Babbie, 2015). In this study, I assumed that Bandura's (1977) self-efficacy theory was a relevant and applicable framework for the study. I assumed that the topic, the complexity of technology in the retail work environment, and the results of this investigation were relevant to the empirical literature. The applied significance of this study was that results from this study could allow for the development and implementation of strategies to reduce technostress, improve ICT-related knowledge and skills, and increase productivity among retail employees.

Other assumptions applied to the sample in this study. A key assumption in this study was that study participants would understand the survey questions and answer them honestly. Another assumption was that the sample of 112 retail associates were representatives of the retail workforce population. The use of random sampling increased the likelihood that this assumption would meet the requirements. Correlational designs involve two threats to internal validity, both of which pertained to study participants

(Babbie, 2015; King & Bruner, 2000). One threat was the *self-selection bias*, in which respondents differ from nonrespondents in critical ways (Babbie, 2015). For example, women more than men, and individuals with higher rather than lower educational attainment, tend to participate in studies (Cunningham et al., 2015). In this study, participants completed the study survey online. It is possible that individuals who chose to participate in this study were more technologically adept than those who did not participate. A further assumption was that the study would not be affected by social desirability bias, wherein participants overstate positive attributes and behaviors and understate negative ones in order to be viewed more favorably (King & Bruner, 2000).

Inclusion of certain methodological procedures helped to increase participants' honesty in answering the survey questions and reduced the likelihood of the self-selection and social desirability biases. These procedures included the implementation of recruitment and data collection procedures that met the ethical guidelines for research with human subjects. The incorporation of ethical procedures, such as securing informed consent, emphasizing the protection of participant confidentiality, and stipulating that participants were free not to answer any or all survey questions (Babbie, 2015) mitigated the risk of biases.

Some assumptions reflected an issue in the study instrument and statistical analyses. One assumption was that study variables were appropriately operationally defined by Tarafdar et al.'s (2007) ICT-driven scales. Psychometric evidence supported the argument that Tarafdar et al.'s (2007) scales provide are valid and reliable. I determined that the scales had sound interrater reliability by computing Cronbach's

alphas for each measure. A Cronbach's alpha between .70 and .79 is considered good, between .80 and .89 is considered very good, and Cronbach's alphas equal to or greater than .90 are considered excellent (Vaske, Beaman, & Sponarski, 2017). Results from an a priori power analysis using G*Power (Nieuwenstein et al. 2015)—in which the alpha level was set to .95, power was set to .95, and the effect size was set to small (f^2 =.25)—confirmed that a sample size of 112 participants was sufficient to detect a significant result.

Hierarchical linear regression (HLR) for mediation was the method to test study hypotheses. HLR implied certain assumptions about the data that needed testing: (a) univariate and multivariate normality, (b) homoscedasticity of errors, (c) linearity between the predictor and mediating variables and the criterion variable, and (d) lack of multicollinearity between the predictor and mediating variables (Tabachnick & Fidell, 2014). I conducted certain statistical tests to determine whether data met these assumptions, and I addressed any violations of assumptions by following statistical recommendations, as outlined by Field (2017).

Limitations

Simon and Goes (2013) defined limitations to research as aspects of a study that can weaken a researcher's ability to confirm the validity of findings and generalize results. This study was nonexperimental, a design that did not include the ability to determine causality (Curtis, Comiskey, & Dempsey, 2016). I administered the survey using the Qualtrics platform. The online format limited my ability to confirm whether the participants understood the survey questions and answered them as intended. The use of

the online format also limited the ability to generalize findings to other settings; for example, the method of data collection did not guarantee that similar results from studies, where participants responded using paper-and-pencil surveys, were available (Babbie, 2015). While the use of random sampling enhanced the likelihood that the study participants would be representative of the population, the geographical focus of the study was central Florida, and this isolation limited the ability to generalize study findings to the national population of retail workers.

Delimitations

The study's delimitation of concerned participants included inclusion and exclusion criteria (Simon & Goes, 2013). I delimited the participants to frontline workers in the central Florida retail supply-chain industry who use ICTs as part of their daily work activities. Participants were adults (age 18 or older) who had internet access. The participants were able to read English on a fifth grade level [the reading level of English in Tarafdar et al.'s (2007) instruments]. To adequately gauge technostress, self-efficacy, and productivity, employees had to have worked in their current position for at least 6 months. The specificity of participant criteria limited the ability to generalize findings to (a) individuals who held managerial, technological, administrative, or other positions in the retail field; (b) employees who worked outside the field of retail; (c) those who worked in the retail industry in other states; (d) workers who did not have internet access; and (e) employees whose first language was not English.

Significance of the Study

Organizational professionals seek to minimize the stressors of technology usage and increase productivity in retail supply-chain organizations (Tarafdar et al., 2014a). Retail supply-chain managers could use the results of this study to provide value to business leaders regarding how to reduce employee technostress and increase employee productivity. Few previous studies exist regarding the effects of technostress on employee productivity for retail supply-chain professionals in Florida (Tarafdar et al., 2015).

Contribution to Business Practice

Retail supply-chain managers might benefit from understanding whether technological self-efficacy mediates the relationship between technostress and employee productivity, thus providing for satisfying work experience and increased productivity (Wood, 2014). The results from this study could inform the development and implementation of training programs to help reduce frontline retail employees' stress and enhance their sense of efficacy in using work-based ICTs. The increased investment in employee ICT-related training could ultimately lead to increases in retail revenue and return on investment.

Implications for Social Change

The social implications of this study include the potential for helping individuals reduce stress. The results have the potential to promote social change within the retail industry through mentorship, communication, employee engagement, and employee well-being. Increased self-efficacy and decreased technostress could improve the health and

well-being of individuals who face technostress at work and thus reduce health costs to employees.

A Review of the Professional and Academic Literature

The existing professional and academic literature on technostress is a continuous study of employee productivity (Alam, 2016). As technology advanced in retail supply-chains, scholars reported that technostress negatively impacted employee productivity (Tarafdar et al., 2010). The study of technostress is deficient in some areas of the retail supply-chain, even as losses of potential revenue accrue, and the number of disgruntled employees increases (Haddad & Taleb, 2016). The intent of this quantitative study was to focus on the examination of employee productivity and contributing factors of technostress and technological self-efficacy.

I used the following search terms and phrases, alone and in combination, to find relevant peer-reviewed articles: (a) *retail*; (b) *retail employees*; (c) *retail front-line staff*; (d) *work technology*; (e) *innovative information and communications technologies (ICTs)*; (f) *retail technology applications, stress development;* (g) *work-based stress*; (h) *retail employee stress*; (i) *technology-related stress*; (j) *technostress*, *general self-efficacy*; (k) *technological self-efficacy*; (l) *employee performance*; (m) *employee training*; and (n) *employee productivity.* I used the following databases: EBSCOhost, ProQuest, ABI/Inform Global, Science Direct, SAGE Premier, Emerald Management, and UMI ProQuest Digital Dissertation database. The EBSCOhost database was the most comprehensive source associated with business and technology.

The review of the literature included 185 articles, dissertations, and seminal works, 155 of which had publications dates between 2013 and 2018. In the review, I included two seminal sources (Bandura, 1977; Brod, 1982) and an additional 10 contemporary sources related to the theoretical framework. Of the 185 references, 157 articles were peer-reviewed and published between 2013 and 2018, which ensured that a minimum of 85% were peer-reviewed and had been published within 5 years of the anticipated completion of the study.

The focus in the literature review was on the constructs related to technostress, technological self-efficacy, and employee productivity. The literature review unfolds in the following sections: (a) theory of general self-efficacy, (b) generalized self-efficacy in business technology, (c) predictors of generalized self-efficacy, (d) outcomes of generalized self-efficacy, (e) technological self-efficacy, (f) technostress, (g) technostress and employee productivity, (h) technostress and technological self-efficacy, and (i) outcomes of technostress. Throughout the literature review, I present a critical analysis and synthesis of varied viewpoints and compare and contrast the findings of previous researchers.

Theory of Self-Efficacy

Bandura's (1978) general theory of self-efficacy is part of a social cognition construct (social learning). Self-efficacy refers to an individual's ability and belief in self to perform a particular task and a reliable predictor of task performant for individuals. Creating a positive environment promotes self-efficacy among employees by increasing

the workers' participation in the task. Bandura noted that positive self-efficacy helps build confidence in the employees' ability to perform.

According to social cognitive theory, employees' trust in themselves, or self-efficacy, impacts their work behaviors. Ozyilmaz, Erdogan, and Karaeminogullari (2017) collected data from 363 employees and their respective supervisors at a manufacturing organization in Turkey, measuring the relationship between self-efficacy for core operational tasks. Self-efficacy of the participants had significant positive effects on task performance. The results of the study suggested that the motivational value of trust in oneself is stronger when employees also had high trust in self; by contrast, low trust in oneself neutralizes the motivational benefits of self-efficacy (Ozyilmaz et al., 2017). The effects of self-efficacy on performance were stronger when the task was low in complexity (Ozyilmaz et al., 2017).

Bandura (1978) identified four sources of self-efficacy. The first is *enactive mastery* or perceptions of ability in performing a behavior based on previous success or failure. Employees' cognitive behaviors, as demonstrated in their success or failure in work abilities, provide a measure of enactive mastery.

Ethical leaders can enhance followers' self-efficacy through affective arousal and enactive mastery, which helps to increase the confidence of an employee to initiate, follow through, and sustain an action (Karim & Sarfraz, 2016). Ethical leaders care more about employees' best interests and are likely to create a safe environment for employees to get direct feedback regarding their enactive mastery (D. Wang, Gan, Wu, & Wang,

2015). Transformational leaders leverage enactive mastery, ensuring certain behaviors grounded in self-efficacy (S. Y. Hassan, Bashir, Abrar, Baig, & Zubair, 2015).

Enactive mastery of self-influences an employee's self-efficacy and vice versa. Overall, the employee's self-efficacy and can-do behavior influence their abilities and thus their performance. Self-efficacy stems from confidence, knowledge, and past work experience that employees model in repetitive tasks or apply to a new way of working. Employees with previous experiences and on-the-job successes exhibited more confidence to complete the similar task (high self-efficacy) than those who do not (low self-efficacy; Karim & Sarfraz, 2016).

The second source of self-efficacy is *vicarious experience* or *modeling,* in which observation and the achievement or failure to complete a task shapes an individual's level of self-efficacy. The process of training to increase levels of self-efficacy is possible through what Bandura (1977) classified as vicarious experience (the modeling of an experience with a clear outcome). Bakar, Ali, and Zaki (2016) concluded that leaders should incorporate cues of self-efficacy (vicarious experience) in training programs to boost the self-efficacy of employees, as vicarious experiences tend to be significant predictors of performance.

Employees might watch others with experience performing a task to learn the steps involved. Then, the employee is capable of repeating the behavior (Bakar et al., 2016). Modeling is most effective when the modeler has similar characteristics to the observer and when the modeler's behavior produces clear and identifiable results (Bandura, 1978). A strong sense of self-efficacy emerges when the model successfully

achieves the goal of interest; in contrast, a decreased sense of self-efficacy results from the model's failure to achieve the goal (Bakar et al., 2016).

The third source of self-efficacy is *verbal persuasion* (Bandura, 1978). This source pertains to the verbal encouragement of others as well as employees' own reinforcing self-talk that they can successfully perform a behavior. Verbal persuasion is less effective than enactive mastery or modeling, as the individual has not yet developed a schema, or internalized representation, of how to successfully perform the behavior. In the organizational frameworks, transformational leaders seek to engage employees in motivational strategies and encourage the application of past success or failures in learning new work (S. Y. Hassan et al., 2015). Employees who are influenced by their abilities and applicable knowledge of behavior in the workplace are likely to achieve success (S. Y. Hassan et al., 2015).

The fourth source is *physical/emotional arousal*. Physiological and emotional states influence self-efficacy by affecting, among other factors, stress and anxiety levels, perceptions of ability, and self-confidence (Bandura, 1978). The development of self-efficacy and its influence on behavior is a process, influenced by *triadic determinism*, or the interactions between the person and his/her environment (Bandura, 1978). D. Wang et al. (2015) concluded that performance accomplishments, which are personal mastery experiences, determine the highest level of self-efficacy for employees. Also, a person's perceived efficacy predicts potential performance better than the individual's level of past performance (D. Wang et al., 2015). Managers should develop consistent training programs linked to the overall objectives of the organization

and incorporate (a) mastery experience, (b) vicarious learning, (c) persuasion, (d) and psychological arousal (Bakar et al., 2016).

Several authors researched and measured general self-efficacy and its impact on employee performance (Cumberland, Meek, & Germain, 2015; Rapp, Baker, Bachrach, Ogilvie, & Beitelspacher, 2015). In their study of retail salespersons, Rapp et al. (2015) determined that showrooming (the practice of examining merchandise or products in a store and then buying online for a lower price) is negatively associated with a retail salesperson's self-efficacy and decreased performance. Rapp et al. (2015) concluded that a retail salesperson's self-efficacy and performance increased as the retail salespersons become more confident in their role and develop coping strategies.

Cumberland et al. (2015) found a significant correlation between general measures of self-efficacy and retail performance. Results indicated retail employees' self-efficacy and ability to perform held true regardless of the competitive or technological turbulence of the environment. Further, retail workers' self-efficacy and performance was responsible for a large percentage of a firm's revenue; therefore, workers with high self-efficacy were the most effective employees (Cumberland et al., 2015).

In a study of retail business, Domingues, Vieira, and Agnihotri (2017) examined the effect of goal setting and an employee's learning orientation on the level of sales performance of the retail business. The study results from a multilevel hierarchical analysis of the participants indicated that transactional leadership (a style characterized by contingent reinforcement rooted in ulterior motives such as praise and rewards or negative corrective actions) had a positive link between learning orientation and sales

performance, whereas transformational leaders (who provide unrivaled motivational tactics and develop employees toward the optimization of self-efficacy) weakened the positive association between learning orientation and sales performance (Domingues et al., 2017). Other results indicated transformational leaders' effectiveness influenced employees' extra effort in completing a task (Seltzer & Bass, 1990). The results for initiation of self-efficacy indicated a positive relation to effectiveness of transformational leadership.

The negative effect of transformational leaders involved the follower-dependency logic and overdependence on supervisory cues (Domingues et al., 2017). Additionally, the findings indicated that the level of self-set goals is an indicator of self-efficacy. The similarities between transformational and transactional leadership styles appear in the ethical and moral distinctions that separate the two styles and thus reveal a true authentic transformational leadership.

In the business sector, greater emphasis on relationship technology has increased the importance of employee adaptability. Chatman, Caldwell, O'Reilly, and Doerr (2014) found that most employees were competent and willing to adapt to technological changes and perform under adverse circumstances in a stable workplace culture. Haddad and Taleb (2016) argued employees are better able to adapt when they have control over their learning of the new application. Employees with high self-efficacy perform better, are more persistent, and exert more effort in task completion. Chatman et al. (2014) found that capable employees adjust their behavior to varying personal demands when they see another person model the behavior. By contrast, employees with lower self-efficacy were

easily frustrated with challenging tasks, exerted less effort, and tended to give up easily (Haddad & Taleb, 2016).

Bandura (1978) identified three types of assessments (appraisals) that mediate the relationship between each of the four sources of self-efficacy and motivation: (a) the analysis of task requirements, or the knowledge, skills, and behaviors needed to perform and achieve a goal; (b) the attributional analysis of experience, which pertains to an individual's judgment of the specific degree of experience needed to achieve the goal; and (c) the assessment of available personal and environment sources and constraints that affect the achievement of a goal (Bandura, 2011). Breevaart, Bakker, and Demerouti (2014) examined the role of self-efficacy in mediating the relationship between self-management training and job performance in Frayne and Geringer's (2000) study. Breevaart et al. (2014) suggested that hopeful employees tend to be creative. General work-related self-efficacy of employees predicts creativity; however, managers who foster employees' general work-related self-efficacy can provide specific outcomes of creative performance (Breevaart et al., 2014).

The use of self-efficacy theory in empirical literature related to business management and information technology is growing, in part spurred by Gist's (1987) seminal article denoting the implications of using self-efficacy theory in organizational leadership studies. Gist (1987) argued that the consistent link between self-efficacy and performance, as it relates to academic achievement, health, and health-related and prosocial behaviors, suggested numerous implications for organizational literature related to employee performance.

For example, business management and informational technology literature (e.g., Johri & Misra, 2014; Marinova, Peng, Lorinkova, Van Dyne, & Chiaburu, 2015; Shoji et al., 2016) supported the validity and utility of the social learning theory and the existence of strong links between task performance and self-efficacy. Self-efficacy beliefs are a central factor that influences the choices people make, their goals, the amount of effort they expend, how they persevere at a task in the face of difficulty, and the amount of stress and vulnerability they experience (Johri & Misra, 2014). Self-efficacy influences motivation. As such, individuals with high self-efficacy in certain domains continue to engage in domain-related behaviors they feel capable of achieving. In contrast, low self-efficacy sometimes prevents individuals from performing a certain task and makes them less motivated to learn new tasks if they are unsure of their abilities.

Bandura's (1978) theory of self-efficacy is one of the most known and most used theories in empirical research. Scholars in the fields of education, psychology, and sociology have extensively relied on self-efficacy theory as a guiding theory. Self-efficacy for individuals is critical to understanding thought versus action, and supporting people with behavioral changes. People who allow for positive verbal encouragement from others show a reduction in self-worth and therefore present a higher self-efficacy. The ability to minimize negative thoughts and keep a positive attitude while enduring challenging tasks allows for individuals to achieve a level of self-efficacy (Iroegbu, 2015).

General Self-Efficacy in Business Technology

General self-efficacy (GSE) is an individuals' belief in their ability to perform well in a variety of situations and has been the subject of increased research attention (Lightsey et al., 2014). General self-efficacy is the belief that a person can inquire about the resources needed to deal with challenges. That is, general self-efficacy is a trait-like belief in one's competence (Lightsey et al., 2014).

The implementation of technology for professionals has had many benefits, such as information collaboration and increased response time worldwide (Shin & Eksioglu, 2015). Moreover, individuals' application or understanding of the new technology within the enterprise systems allows for improved productivity but requires changes to advanced systems (Shin & Eksioglu, 2015). The researchers also noted the lack of professional involvement in change management by some managers suggested a lack of usefulness. Thus, the loss of the potential benefits of the new system might have caused professionals to experience technostress because of the resistance to the new application of changing technologies (R. Hassan, 2014). Furthermore, the lack of self-efficacy in employees who use technology might cause professionals to experience technostress, and the individuals' perception of their abilities to use new technology might result in a negative experience for professionals (R. Hassan, 2014). Observation of individuals' self-efficacy when performing the technical tasks and efficiencies allowed management to envision the entire dynamics of their enterprise system (Issa & Isaias, 2014).

Adil (2014) contended that change management is essential to establishing organizational readiness where all members share the commitment to change

management. Organizational leaders' readiness for change varied based on how much each member valued and accepted the critical determinants of practical competencies such as (a) task management, (b) resource reliability, and (c) inferential aspects of the organization. Adil asserted that when organizational readiness for change is higher, business members are likely to (a) inaugurate the change, (b) apply a significant attempt, (c) explore greater stamina, and (d) exhibit more of reciprocal behavior. The underpinning goal of organizational leaders is to embrace the change efficiently and cost-effectively while maintaining a competitive edge within the market enterprise (Adil, 2014).

Enhancing employees' belief in their abilities to perform a particular task is a critical management strategy employed by transformational leaders (Mokhber, Tan, Vakilbashi, Zamil, & Basiruddin, 2016). Analysis of data from 100 Malaysian companies indicated a positive relationship between self-efficacy and transformational leadership (Mokhber et al., 2016). Transformational leaders exert influence by communicating and addressing their employees' needs. and they inspire, motivate, and encourage employees by enhancing the value of their work and their abilities to perform tasks (Mokhber et al., 2016). Strategies for enhancing the skillset of employees must incorporate a high level of self-efficacy in business organizations. Transformational leaders lead to enhance employee self-efficacy and exercise enactive mastery and verbal persuasion to convince employees of their abilities to perform a task (Bandura, 1977; Mokhber et al., 2016).

Transformational leaders challenge employees and expose them to opportunities to experience mastery and self-worth. Transformational leaders emphasize high

expectations from employees regarding work fulfillment and bottom-line productivity (Mokhber et al., 2016). The Pygmalion effect, according to Gist (1987), is a phenomenon that results in an employee's enhanced performance because the positive influence of others leads to enhanced self-efficacy. Transformational leaders can enhance the self-worth of their employees by emphasizing the importance of self-belief. Thus, a strong sense of self-worth might lead to higher self-efficacy and a sense of self-confidence (Mokhber et al., 2016).

Transformational leaders also enhance performance and commitment by employees (Mokhber et al., 2016). Self-efficacy might serve as an antecedent of work-engagement, which, according to Xanthnopoulou, Bakker, Demerouti, and Schaufeli (2009), is positively related to employee work performance. Research with employees revealed a strong correlation between efficacy awareness and operation (Gist, 1987; Mokhber et al., 2016). Intervention by transformational leaders influences self-efficacy in employees, thereby empowering employees to perform tasks more competently.

Organizations and leaders attempt to maintain success (Mesterova, Prochazka, Vaculik, & Smutny, 2015). One critical variable is leadership effectiveness. The aim of this research is to examine the role of a leader's self-efficacy from the perspective of their employees. Recently, researchers have become interested in the term *general self-efficacy* (Mesterova et al., 2015). General self-efficacy theory differentiates among individual employees and their ability to view themselves as capable of completing a task. General self-efficacy is a motivational trait; as applied to leaders, general self-efficacy refers to their beliefs in their general ability to guide (Mesterova et al., 2015).

On the basis of the theory of self-efficacy, leaders with greater self-efficacy are more effective leaders, because leaders must exert greater efforts to fulfill their roles across broad perspectives and to persevere when they face challenges. Thirty-two Czech leaders and 604 employees participated in a study of leadership self-efficacy (Mesterova et al., 2015). The results of the relationship of self-efficacy to transformational leadership did not support the theory of general self-efficacy. Based on the results, highly effective leaders seemed overly capable, so employees left the important work decisions to their leaders; therefore, high self-efficacy among leaders had a negative impact on employees' work performance (Mesterova et al., 2015).

For an employee, understanding self-efficacy and the flexibility to try a task under various conditions builds a body of knowledge that increases the ability to perform the task and the self-efficacy to believe in the ability to do the task (Mesterova et al., 2015). An individual might influence human behavior through personal self-efficacy and environmental influences. General self-efficacy is the belief in the individuals' ability to complete a challenging task in business technology, and high employee productivity is a necessity. The implementation of new technology caused technostress for users in applying the new changes. The commitment level of employees and readiness for change also affects the competitive edge of the market enterprise. Regardless of the person's status, employees need to know their work value. When employees understand their worth, their self-efficacy levels increase and in turn produce higher productivity ratings.

Predictors of General Self-Efficacy

Scholars (e.g., Jaiswal & Dhar, 2015; Jerusalem & Mittag, 1995) applied Bandura's (1978) theory of self-efficacy to examine the antecedents of employees' generalized self-efficacy beliefs in a stressful environment. Findings from these studies provided information on the key predictors (i.e., enactive mastery, modeling, verbal persuasion, and physiological/emotional states) of self-efficacy among employees.

Jerusalem and Mittag (1995) evaluated the theory of self-efficacy and examined the predictors of generalized self-efficacy in life transitions. The researchers examined whether the two sources of self-efficacy, enactive mastery and physiological/emotional states, influenced general self-efficacy among 124 German young adults (mean age of 25 years) experiencing a life transition. Jerusalem and Mittag found that enactive mastery, defined as prior failed experiences, did not significantly influence a person's sense of generalized self-efficacy. However, the researchers documented a significant association between the physiological/emotional cue of perceived stress and generalized self-efficacy in these 124 individuals. The researchers also found that, as age increased, generalized self-efficacy in the face of life transitions decreased. This finding emphasized the argument made by scholars (e.g., Gist & Mitchell, 1992; Johri & Misra, 2014) that factors other than the four Bandura (1978) identified might influence self-efficacy.

Jaiswal and Dhar (2015) evaluated the theory of self-efficacy and examined the predictors of general self-efficacy in the use of creative technology. Findings indicated enactive mastery of a prior failed service of innovation did not significantly influence an employee's self-efficacy when implementing new creative ideas. Jaiswal and Dhar

contended that employee creativity might strengthen through high creative self-efficacy. The environment and leadership support of creative innovation must be high.

Verbal persuasion was more effective among employees with high self-efficacy (Jaiswal & Dhar, 2015). More specifically, employees with higher creative self-efficacy were more likely to mobilize their creative potentials into creative outcomes. Results from these studies (Jaiswal & Dhar, 2015; Jerusalem & Mittag, 1995) suggested that physiological/emotional states might be most influential, and the enactive mastery is less influential in generalized self-efficacy among employees. Furthermore, factors (e.g., age) other than the four cues identified by Bandura (1978) might influence job-based generalized self-efficacy beliefs.

From a theoretical point of view, personal resources and environmental constraints differ within the stages of generalized self-efficacy. Individual beliefs about self-efficacy serve as a key concept that impacts the environmental demands of stress and managing difficult circumstances of life transitions (Jaiswal & Dhar, 2015). Individuals who had navigated difficult transitions displayed higher self-efficacy than those who had not. A high sense of self-efficacy makes life less stressful, whereas strong distress might accompany low self-efficacy. The environment and support of leadership strengthen a creative self-efficacy in individuals. Verbal persuasion of individuals specifically identified a high creative self-efficacy (Jaiswal & Dhar, 2015). The role of innovation and creative self-efficacy among employees' provided direction for leadership to design programs for improved worker creativity.

Outcomes of General Self-Efficacy

General self-efficacy is the belief in one's competence to attempt a difficult task and to cope with adverse situations (Bandura & Wessels, 1997). People with high self-efficacy choose to perform more challenging tasks; they set higher goals and stick to them. Highly self-efficacious people invest more effort than those with low self-efficacy (Bandura & Wessels, 1997). When setbacks occur, individuals might recover quickly and remain committed to their goals. Thus, self-efficacy is an essential element in coping with the challenges and demands in any situation (Bandura & Wessels, 1997).

Cherian and Jacob (2013) argued that individual measurements of job involvement and organizational commitment had little impact on employees' work productivity. In addition, an individual's commitment to their career allowed for improvements in work skills and performance (Blau, 1989). Cherian and Jacob (2013) noted evidence linked to employee self-efficacy and productivity allowed individuals to resolve issues using advanced technologies such as new software. Cherian and Jacob further mentioned self-efficacy as applied to work productivity had a positive effect on employees with high self-efficacy.

Ubale and Dhabe (2019) noted employees' self-efficacy in small and medium enterprises (SMEs) presented a challenge during implementation of new business process reengineering (BPR) technology tools. The BPR is the analytical redesign of workflow structures within an enterprise (Ubale & Dhabe, 2019). The success of integrating the BPR model resulted in a significant reduction in cost or cycle time. Specifically, India's enterprise and leaders challenged the building of robust infrastructure to improve their

business structure. However, the implementation of the BPR model can strengthen business operations and management to be more efficient and competitive (Ubale & Dhabe, 2019).

Ubale and Dhabe (2019) noted that individuals' self-efficacy and vicarious experiences improved employees' performances. The pairing of individuals with similar backgrounds was successful at raising self-efficacy in employees. Ubale and Dhabe contended that the constructs of self-efficacy theory are a key determinant of individuals' ability to accept the new technology to increase productivity and become technically ready within the SME. Thus, the industry's managers' productivity and technical readiness could show a positive relationship between self-efficacy and employee productivity (Ubale & Dhabe, 2019).

A central tenet of Bandura's (1977) social cognitive theory is general self-efficacy, people's belief and confidence that they can succeed or produce a desired outcome at a high level of self-efficacy. The theoretical underpinning is that individuals with a well-developed sense of higher work self-efficacy behavior are more likely to perform successfully in the work environment. Previous researchers documented a correlation between self-efficacy and the ability to cope with the workload (Cherian & Jacob, 2013; Ubale & Dhabe, 2019).

Technological Self-Efficacy

Computer expansion applies not only to the user's capabilities and skills but also to the many software applications included in the 21st century computer environment (Tarafdar et al., 2014b). One widely researched technological version of self-efficacy is

computer self-efficacy and its effects on user's ability. A review of the literature related to technological self-efficacy was specific to issues with (a) computer anxiety, (b) ability to use a computer, and (c) employee productivity with new technology. Technological self-efficacy is the belief in one's ability to perform a technological task with a successful outcome (Tarafdar et al., 2014b).

The technological innovation of professionals can increase the levels of productivity and efficiency in territories like retail supply-chains (Mirkovski, Lowry, & Feng, 2016); however, when low levels of technological self-efficacy existed, the retail supply-chain employees became resistant to change within the organization. Therefore, low self-efficacy and resistance to change in the technology of retail supply-chain professionals subsequently can lead to stress in technology (Mirkovski et al., 2016). In addition, S. Wang and Wu (2008) noted a significant relationship between the members who had higher levels of self-efficacy. Members who had extreme levels of self-efficacy applied distinctive strategies, such as high order thinking skills and training, toward their proficiencies.

Mirkovski et al. (2016) emphasized employees' level of technological self-efficacy could lead to retail supply-chain professionals mastering constant innovative changes within an organization. These findings are vital to understanding the impact of innovative self-efficacy and how technostress affects employee productivity. The results of this study could determine whether self-efficacy mediates a relationship between technostress and employee productivity among retail supply-chain professionals in the state of Florida**.**

In summation, the implementation of technological innovation can lead to technostress for professionals who display low self-efficacy. Employee performances might serve to reinforce both positive and negative feelings about technology. In addition, technological self-efficacy might play an important role or decision to accept the technology and ultimately in the performance of the task (Mirkovski et al., 2016).

Technostress

Users' dependence on technologies and business leaders' quest to incorporate such technologies for business processes increased dramatically (Srivastava, Chandra, & Shirish, 2015). The surge in technology for work processes is demanding employees adapt to new applications and workflow functions (Tarafdar et al., 2014b). As business use of technologies become increasingly complex, employees found it difficult to cope (Tarafdar et al., 2014b). Research into the cognitive responses to the stressors of technology use in the work environment is known as *technostress* (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008; Tarafdar et al., 2014a).

Brod (1984) defined technostress as the mental stress experienced by an employee due to the use of information and communication technology (ICT) in a work environment. Brod noted the research in the study would enhance the understanding of technostress, technological influence of control, and performance. Brod extended the research to focus more on the measurements to reduce technostress and practical ways managers must employ to cope with technostress. Specifically, Brod (1984) noted the effects of technostress on employee productivity and explored how to cope with the negative aspects of technostress.

The examination of technostress and the factors that create an inhibitive stress within a firm is rooted in a cognitive paradigm wherein stress emerges as a phenomenological process rooted in individuals' demands of the environment. Therefore, the use of information and communication technology (ICTs) might cause an increase in stress when the users' level of competency is minimal, thereby threatening the users' well-being (Fuglseth & Sørebø, 2014). In 1982, Brod indicated that technostress occurred in professionals when work-related task caused distress when using technology. As a result, productivity diminished, and the negative effects began in professionals.

Technostress for professionals leads to reductions in production caused by reduced use of technology. Most users' lack of control of technology was not able to make necessary modifications to decrease technostress, which resulted in the retraction of technology usage. Brod (1982) further contended that those who used new technology experienced increased information overload in their learning curve. The intensification of issues materialized by the poor internal abilities to solve problems, low levels of efficacy of internal control, and external social controls associated with technology.

Professionals experience high levels of technostress when employees' competency levels in information technology (IT) systems are insufficient (R. Hassan, 2014). A professional's incompetency in IT means the user is deficient in the skills required to implement the demands of the new technology. R. Hassan (2014) indicated that increased work stressors might lead to a decrease in productivity. Moreover, verbal input from managers might also influence employees through encouragement or discouragement about their abilities (Abad, Golshani, Imamipour, & Hassani, 2016). The

self-efficacy theorists Bandura and Whalen (1966) noted the most efficient way to enhance technological expertise is to cultivate a strong sense of self-efficacy. Thus, the mastery of technological self-efficacy is attainable for professionals with a high level of technological self-efficacy skills.

R. Hassan (2014) found that individuals with specific abilities to perform a task have a greater sense of technological testing for usability and a key component of the organization's implementation process. Issa and Isaias (2014) reported the testing process of new systems' *usability* was a crucial factor in the information systems management, human, and computer interaction. Issa and Isaias (2014) confirmed that the measure of the Institute of Electrical and Electronics Engineers' (IEEE) usability was the ability to learn and operate a new system or component with ease. The International Standards Organization of Managers argued that a usability scale of technical components must measure and meet three criteria for users: satisfaction, effectiveness, and efficiency of components (Issa & Isaias, 2014). Researchers concluded that usability testing in a laboratory differed from the usability system in the workplace (Issa & Isaias, 2014).

In summation, technology use in the work environment and the mental stress induced by ICT comprises technostress. Brod (1982) found that technostress causes some negative impact on productivity, and technostress might threaten users' well-being. The individuals' lack of technological control might result in the retraction of technology. Professionals obtain mastery of technological self-efficacy with high levels of technological self-efficacy skills.

Technostress and Employee Productivity

Few studies had examined the relationship between technostress and employee productivity among service providers (Issa & Isaias, 2014; Shin & Eksioglu, 2015). The definition of employee productivity is the input ratios and efficiencies measured and observed by the maximum potential of outputs obtained from inputs (Shin & Eksioglu, 2015). Productivity for employees equals outputs with limited input resources, and productivity is a useful measure for comparing similar organizations (Shin & Eksioglu, 2015). In the *National Retail Federation Annual Report,* Vlachos (2014) suggested that several indicators challenged the measurement of retail productivity [key performance indicators (KPIs), sales, customer returns, labor costs, inventory turnover ratios, return on capital exchange, gross margin return on investment, and inventory-to-sales] because of the intangible outputs and inputs characteristics. Therefore, maintaining high productivity is key to the maintenance of high profitability on a long-term basis.

Numerous industries have adopted the use of item-level RFID tagging (Vlachos, 2014). RFID is a technology that uses tiny computer chips to track items from a distance. In addition, the European Union Commission adopted the tracking device of RFID for quality and safety measures of the food and beverage industries. Parreño-Marchante, Alvarez-Melcon, Trebar, and Filippin (2014) noted that the RFID system improved inventory operations, supply-chain efficiencies, and productivity of retail corporations. Conversely, many organizations are uncertain about the RFIDs' ROI. Shin and Eksioglu (2015) noted that most small and medium enterprises (SMEs) perceived the investment in the RFID technology as risky, while larger enterprises enjoyed the economy of scales.

For SME managers, the implementation of new technology like the RFID is cost-ineffective because of the initial up-front cost.

Over the last two decades, the need for technology has rapidly increased for business use (Forsythe & Ahmadian Fard Fini, 2018). Retailers and suppliers are under pressure to deliver more goods and stay competitive. For example, if a problem occurs within the supply chain, the delay might cause the retailer to risk losing consumers. Saravanan, Raj, Nalawade, and Seetharaman (2018) argued for using cloud-based software to track and manage inventory in real time. The software allows retailers to respond to the latest demand signals in real time. Saravanan et al. posited the use of an RFID tag allowed for tracking inventory and stock levels. In addition, the supply-chain management movement allowed managers to locate the merchandise and inventory volume from all operational levels for informed business decisions. Thus, a more precise level of inventory visibility ensured product location in the supply-chain.

Most organizational managers aspired to be competitive and maximize their ROI from technology through employee productivity. Vlachos (2014) revealed that organizations must plan in three key areas: (a) efficiency, (b) asset utilization, and (c) consumer response. Further, a firm must understand their current processes and performances such as a warehouse management system (WMS) integrated with an inventory management system (IMS) for the sake of efficiency; these measures allow for a reduction in operating cost and improved employee productivity (Vlachos, 2014). The best approach for management is to ask the financial agents how to approach the return and calculate the investments' implementation of the technology.

Vlachos (2014) posited that the more precise and realistic the goals of innovation, the better the ROI. Specifically, managers applaud improved customer service and response time from a time management system (TMS) or a reduction in operation costs from a new WMS system. Thus, a firm without the capabilities of a baseline and subsequent measures of ROI might become deficient.

Cui et al. (2014) reviewed whether RFID is a complex technology that leads to higher levels of ROI and benefits when a high level of collaboration among supply-chain members is present. The specific measurements of ROI depend on the specific applications employed, but most supply-chain baselines are centered on cost savings, revenue generation, or other quantifiable operational improvements (Cui et al., 2014). For example, operations-oriented systems like a WMS, TMS, or procurement-automation system of supply-chain management could focus on administration expenses, greater input, inventory returns, or labor productivity of employees. The costs for each area are measured against the baseline, as established by the ROI assessment.

Using technology such as RFID systems with suppliers is a fundamental factor in the supply chain, and choosing the right technology might affect a positive ROI (Vlachos, 2014). Before implementing the RFID new technology, enterprises, partners, and industries must establish a need. Other factors such as the deployment of RFID technologies within the entire supply chain would allow for shared cost with easier implementation procedures, which allow manufacturers and retailers to maximize profit share and minimize cost. For example, Walmart employed 100 large suppliers to

integrate RFID systems at the pallet and cast levels of procurement in 2005 (Shin & Eksioglu, 2015).

Determining employee productivity is essential for organizations to determine if an RFID investment is necessary. Shin and Eksioglu (2015) disclosed several studies that correlated labor-cost savings to improved employee productivity with the adoption of the RFID technology. Measuring productivity is a challenge for most retail industries because of the lack of consensus about the proper measurements for retail supply-chain inputs and outputs. Large retail outputs measure the gross value added for each employee. Therefore, a retail manager's output is spatially disaggregated and networked.

The efficiency of large suppliers is a critical factor affecting employee retail productivity. From a labor perspective, the input measurements include the number of hours worked and employees' wages. According to Shin and Eksioglu (2015), research is limited on the relationship between information technology (IT) investment and financial performance in the retail industry; however, results indicated an indirect effect on the financial performance through inventory management from the IT investment (Shin & Eksioglu, 2015). Total production is the monetary value of all goods and services produced annually. The hours produced by employees and fixed assets are commonly used to generate productivity and capital inputs.

Companies sometimes assume the RFID technology could decrease operational cost and increase employee productivity (Shin & Eksioglu, 2015). The adoption of RFID does not necessarily show a return on investment. The gap between RFID and non-RFID users of 0.004% is not necessary for RFID technology investment. Thus, the RFID

technology of retail supply-chains might allow for more efficient systems (Shin & Eksioglu, 2015).

The literature reviewed contained arguments of the supply-chains firms' dominance in technology implementation and the availability of support. Professionals used complex technologies such as RFID, enterprise resource planning (ERP), electronic data interchange (EDI), and numerous other types of technologies in the daily functions of the supply-chain industry (Farahani, Rezapour, Drezner, & Fallah, 2014). ERP is a large-scale software program designed for modern businesses; the program allows for communication between a business's departments and the internal functions and data. The EDI is the transfer of data from one computer system to another by a standardized message formatting, without human intervention.

Moreover, one investigator noted the attitudes in the United States regarding technology integration in the retail supply-chain industry accounted for increased standards of ROI production and employee productivity (Müller-Stewens & Möller, 2017). The complexity of RFID, ERP, and EDI technologies correlated with increased levels of technostress in numerous studies (Tams, 2015). The findings indicated significant levels of technostress in professionals who use large volumes of technology, as reflected in the problem statement. It is necessary to determine if an individual's lack of self-efficacy in technology contributes to technostress in employees of the supply chain industry.

In addition, individuals' lack of self-efficacy regarding technology caused professionals to experience anxiety, anger, and discernment with technology because of

the uncertainty of new and changing technological systems (Korsakienė, Stankevičienė, Šimelytė, & Talačkienė, 2015). Many professionals with a poor attitude towards technology in the retail supply industry were at a disadvantage from their firms' perspective because retail-supply industries were consistently changing, and the implementation of technologies was necessary for retail managers to include all professionals in the decision process or updates of enterprise systems (ES).

The inclusionary process of all professional workers was essential for determining a relationship between constant technology changes and technostress in retail employees. Organizations measure employee productivity by the maximum outputs obtained from the inputs. The integration of a retail tracking device is an example of an improved tool used for employee productivity. Employee productivity is maximized by the ROI and measuring productivity is a challenge for most retail industries. The increased rate of the introduction of new technology and the lack of self-efficacy over the technology for professionals would provide a source of technostress for employees.

Technostress and Technological Self-Efficacy

Few studies addressed the relationship between technostress and technological self-efficacy among service providers (Ragu-Nathan et al., 2008; Tarafdar et al., 2015). The examination of technostress and factors that create stress within a firm is rooted in a cognitive paradigm wherein technostress emerges as a phenomenological process involving individuals' demands on the environment. Therefore, the use of ICTs can cause a rise in technostress when the users' level of competency is minimal, and this deficiency threatens the users' well-being (Fuglseth & Sørebø, 2014). In 1982, a study by Brod

indicated that technostress occurred in professionals when work-related technological tasks caused distress. As a result, productivity diminished, and the negative effects began in professionals.

Technostress is a phenomenon that includes a condition of stress related to use of information and communication technology (Tarafdar et al., 2015). Technostress is also an inhibitor of adaptation resulting from employees' inability to cope with or use ICTs (Ragu-Nathan et al., 2008). Technostress inhibitors are circumstances of ICT issues that cause job related stress among employees in a firm. For example, the frequent updates of software and hardware, information overload, and unexpected non-connectivity became problems. In this study, I provided an analysis of the complex factor of technostress as mediated by technological self-efficacy of individuals and the related outcomes.

One factor of technology stress is technological complexity, which refers to the inherent quality of ICT that causes employees to exhibit incompetency with the constant changes in technology that manifest in various conditions and cause difficulties in employee productivity. Few researchers had examined technostress specifically with reduced job performance, which is a key factor of organizational environment (Tarafdar et al., 2015). The level of task difficulty also affects the performance of the individual, and reduced efficacy might result in poor outcomes, increased mistakes, and accidents. Thus, the impact of technostress can adversely affect the overall performance of employees' use of technology to accomplish tasks (Tarafdar et al., 2015).

Tams, Thatcher, Grover, and Pak (2015) noted self-efficacy and technological complexity of work industries contributed to technostress of employees. Similarly, Khan,

Rehman, and ur-Rehman (2016) cited a connection between technostress and job satisfaction as a pivotal role of employee productivity enhancement. Consequently, Chesley's (2014) evaluation of work content pointed to technological innovation as a vital point linked to work stress levels of employees. However, Chesley found unrelated ICT usage was a reduced response to work use of ICT, which improved employee productivity. In contrast to the reports by Khan et al. (2016) and Chesley (2014), other researchers linked excessive work-related stress with evidence of continuous restructuring (Connell, Gough, McDonnell, & Burgess, 2014; McVicar, 2015). Thus, changes in organizational structure led to stress-related problems in employee productivity, performance, turnover, absenteeism, and health issues (Connell et al., 2014; McVicar, 2015; Tsiga, Chong, Pu, & Teh, 2017).

Results of previous research of technostress noted that stress hindered one's use of technological units because of the complexity associated with the technology (Hung, Chen, & Lin, 2015). Once the end users gained confidence and exposure to the new technology, technostress levels became stable. Opposing viewpoints from Hung et al. (2015) suggested that techno-overload of complex technology led to improved employee productivity.

Individuals who engage in self-coping methods demonstrated lower levels of technostress, regardless of low levels of vicarious experiences and high levels of workload (Tallodi, 2015). Individuals who had high levels of technological self-efficacy and coping methods for the problem-solving methods had low levels of stress. Chen, Li, and Leung (2016) noted individuals with high internal self-efficacy were not receptive to

a managers' influence. By contrast, Chen et al. (2016) asserted the external vicarious experiences of individuals contributed to the individuals' outcomes. A person with low self-efficacy were more passive, less motivated, and in need of guidance to succeed.

Hsia et al. (2014) noted highly motivated individuals with an internal locus of control were able to control the outcomes of their use of technology. Individuals who possessed internal self-efficacy accepted and used new technology to solve work-related issues. Conversely, Hsia et al. (2014) noted that individuals with external self-efficacy might focus more on the difficulties of using the new innovative technology. Further, individuals' who demonstrated low self-efficacy might contribute to technostress in new technology.

In short, the topics of technostress and technological self-efficacy had received much attention in research that had explored the impact of individual levels of performance and attitudes. Technostress occurs in professionals when work-related technology causes distress. Technostress is an inhibitor of circumstances related to ICT issues. Technostress is the negative link between individuals and their accommodation of new technologies. The complexity of technology might cause difficulties in employee productivity. An individual's self-coping methods are pivotal for solving problems and minimizing stress. Technostress is a result of altered habits with the complication of an employee's inability to cope with modern information technologies within their environment.

Outcomes of Technostress in Information Technology

Information technology is the power behind a new economic revolution of tools for productive workers (D'Arcy, Gupta, Tarafdar, & Turel, 2014). According to the *World Economic Forum Report*, nearly 6 million IT jobs exist, and IT firms strive for higher productivity than their competitors (D'Arcy et al., 2014). However, the era of human frailties began to slow the progress of digital technologies. One implication of technostress is the same qualities that make IT useful reliability, user-friendly, and fast-paced also undermine employee productivity and well-being (D'Arcy et al., 2014).

IT work environments are contractual jobs with low security with high compensations (D'Arcy et al., 2014). The working IT employee is susceptible to high strains, uncertainty, lack of training, and an imbalance of work tasks. IT firms seek highly involved individuals who remain a part of the team. The advantages of employee commitment are less absenteeism, more willingness to share and make sacrifices, and less likelihood to resign from the firm. In addition, individuals' high commitment to their organization also indicated high loyalty and low technostress, high productivity, and a willingness to accept change (D'Arcy et al., 2014).

Pervasive and near-continual use of organizational IT systems take a toll on employee health (D'Arcy et al., 2014). Individuals experience IT technostress for a variety of reasons. Individuals feel forced to multitask rapid devices to feed into real-time use, and short technology cycles for IT vendors allow for constant changes and interface functionalities without much help-desk support. In surveys of 600 computer-users, 73%

of professionals worried that refraining from constant connectivity would put the employee at a disadvantage at work (D'Arcy et al., 2014).

The complex user interfaces do not fit within the scope of task, and workflows are an additional source of technostress, because the employee creates the work overload when in use (D'Arcy et al., 2014). A study based on healthcare IT applications in the context of hospital care delivery processes found that physicians juggled different screens on their monitors to access pertinent data of patients. Most physicians complained of the complexity and extra work of managing numerous screens. As a result, the employees suffered from more technostress (D'Arcy et al., 2014).

Ironically, many employees also felt addicted, as indicated by previous studies of stress-causing technologies (D'Arcy et al., 2014). In a study of mobile e-mail users, 46% of professionals exhibited medium to high addition to technostress. Employees spent time responding to e-mails from home, while commuting each day, and during vacation time. On the other hand, IT managers allowed employees to use social media networks while working on the job (D'Arcy et al., 2014).

Khan et al. (2016) explored the association between technostress and performance in technology and found that job performance plays a pivotal role in work productivity. Atanasoff and Venable (2017) reported that new technology implementation had a negative effect on employees' mental and physical health, performance, and productivity. On the other hand, Chesley's (2014) assessment of work and personal IT usage pointed to the link between technological innovation and employees' level of technostress. However, Chesley found the personal use of IT allowed for reduced negative effects of

work use and improved performance. By contrast, Atanasoff and Venable (2017), Chesley (2014), and other researchers linked stressful work environments to continuous restructuring of organizations (Connell et al., 2014; McVicar, 2015). The findings implied unstable work environments might lead to technostress associated with job productivity (Connell et al., 2014).

As with many additions, employees' desire to stay stimulated became harder to satisfy. Over time, employees seek more ways to stay IT stimulated and productive. Employees must multitask streams of information from different devices in real time. Complex technology users experience work overload due to added features within the technology. Moreover, employees' addiction to IT over a 24-hour period, especially with mobile e-mail users, persists as a trend and could lead to health issues for the employees.

Summary and Transition

Technology plays an essential role in today's world. Technology is also important for people who are equipped with 21st-century skills who seek success in the technology-rich environment and future endeavors. In recent years, numerous entities have put time, energy, and resources into building technological capacity into global industries with the hope that doing so will produce employees who can not only survive but also thrive in today's tech-savvy market.

Technological advances have created opportunities for employees to enhance their learning and integrate technology as a resource. Using technology as a resource enables employees to create a useful significant and relevant working experiences and challenges employees to problem solve and think critically. These skills are necessary for

employees to stay competitive in the workforce. Many employees today are digital natives, people who grew up surrounded by digital media, and they exhibit a unique set of characteristics that managers must consider as they work to maximize employee productivity. Employees cannot and will not integrate technology in the workplace if they lack self-efficacy to use technology effectively; thus, it is imperative that management seek multiple ways to increase employee self-efficacy with regard to technology integration.

Although self-efficacy is a behavior of the decision to use technology, a need remains to identify factors that affect employees' technological self-efficacy and how best to use their resources to develop the best product possible. Measuring employees' level of technology has been done, but factors influencing employees' level of technological self-efficacy must be examined. By identifying factors that play a role in developing employees' technological self-efficacy, managers can focus their efforts to better equip employees with the skills needed to increase productivity in the workplace.

Stress management is useful when technological innovation occurs. Tarafdar et al. (2015) contended that new technology allows for improved productivity and found that the technological changes sometimes came at the cost of losing valuable employees. The new technological innovation required individuals to develop a high technological self-efficacy to understand the developments (Tarafdar et al., 2015). However, the implementation of stress management programs allowed for individuals to receive help and minimize the negative behaviors of pressure and alienation of new technical knowledge.

The research by Tarafdar et al. (2015) indicated that without a coping strategy program, professionals sought other less stressful environments in which to earn a living. The results showed workplace stress afflicted professionals, and this stress led to job dissatisfaction and reduced productivity. Consequently, professionals diagnosed with stress-related illnesses led to expensive lawsuits and negative publicity for organizations. Tarafdar et al. (2015) argued once individuals became familiar with the new technology and mastered its use, there was little difficulty in final adoption, which signified that suitable training of end-users resulted in reduced fears of new technology.

The material in Section 1 included an overview of the background of the study problem, a review of the business problem, and the purpose of the study. Section 1 also included discussions of the nature of the study with the research question and hypotheses, the theoretical framework, operational definitions, assumptions, limitations, and delimitations. Last, Section 1 contained a critical analysis and synthesis of the literature sources and a critical review of the literature related to the study's variables: (a) employee technostress, (b) technological self-efficacy, and (c) employee productivity.

In Section 2, I address the nature and structure of the research study, clarifiy the role of the researcher, describe the participants, and outline the research method and design. I provide justification for the selection of the population and sampling method, a description of the survey instrument, techniques, and analysis methods. Finally, I examine the reliability and validity of the procedures of the study. In Section 3, the data I present contains (a) an overview of the study, (b) study findings, (c) application to

professional practice, (d) implications for social change, (e) recommendations for action and future research, (f) reflections, (g) a summary, (h) and conclusions.

Section 2: The Project

Front-line retail staff largely mediate the customer experience (Accenture, 2017). The use of innovative work technologies can enhance associates' existing technological knowledge and skills, increase their job satisfaction and organizational commitment, and thereby improve productivity (Deloitte, 2017; Jena, 2015). In contrast, the introduction of ICTs without adequate employee training can extract a human cost in the form of technostress (Accenture, 2017). Additional work-related limitations might compound that stress. The majority (>65%) of front-line staff had a high school diploma or equivalent, while one-fourth had less than a high school education (Aspen Institute, 2017). Almost three-fourths of retail workers exhibit very poor digital problem-solving skills (Bergson-Shilcock, 2017). Because of these limitations, retail employees might be more prone to develop technostress, which is a type of work strain resulting from the inability to effectively manage and cope with ICT-work-related practices and procedures (Tarafdar et al., 2007).

Purpose Statement

The purpose of this quantitative correlation study was to examine whether a relationship exists between employee technostress and employee productivity and if technological self-efficacy mediates the relationship. The independent variable was technostress, the mediating variable was technological self-efficacy, and the dependent variable was employee productivity. The targeted population consisted of 112 retail supply-chain employees in the state of Florida. The implications for positive social change included the potential to break the cycle of stress-related issues and provide a

quality work life for employees. A positive work environment can contribute to job retention, which in turn can contribute to a healthy local economy.

Role of the Researcher

As an experienced professional in the retail industry, I experienced the technological advances described in this study. As a former business retail manager, I encountered professionals who displayed symptoms of technostress as described by previous researchers (Chesley, 2014; Tams, 2015; Tarafdar et al., 2014b). As the researcher in this quantitative study, my role was to collect, analyze, and interpret the data to test the hypotheses and answer the research question (Daigneault, 2014).

I had direct knowledge of (a) the retail supply-chain industry, (b) employee stress with technology, and (c) employee productivity. From March 2009 until March 2010, I lived in the geographic area of the study (Florida) and worked as a manager in a retail environment. I have never previously conducted a formal academic study; however, I possess a broad understanding of the retail supply industry. I am familiar with metrics to measure employee technical knowledge and employee productivity. The service metrics included the overall customer satisfaction with a specific service, the cost of a specific service transaction, and the time to complete a specific service transaction. Though I am still a resident of Florida, I am not an employee of any retail supply-chain organization.

Collecting data anonymously through a survey instrument online can mitigate bias (Harp, Scherer, & Allen , 2016). Although I had a past relationship with the retail industry, the topic, and access to the participants, I mitigated bias by not having any direct or indirect contact with members of the study's population, and by collecting data

through an online survey instrument wherein participants remain anonymous. The collection of data remains anonymous because no one, including me, knew who participated in the survey.

I adhered to the ethical principles identified in *The Belmont Report*, which provides a protocol to protect the rights of individuals and their decisions by providing justice and equal treatment to all participants (U.S. Department of Health and Human Services, 1979). I ensured participants understood (a) their participation was voluntary, (b) the study was not harmful to any participants, and (c) each participant had equal opportunity to participate in the study and withdraw at any time without penalty. In conclusion, I presented a synopsis of the findings of the study and offered recommendations for future research. Walden University's Institutional Review Board (IRB) approval number for this study is 03-06-19-0582600, and that approval expires March 5, 2020.

Participants

The targeted population for the research study were people who were (a) 18 years or older, (b) current employees of a retail supply-chain organization in Florida, and (c) able to provide informed consent. According to Hunter (2015), research participants should receive detailed information about the study and agree to participate. To qualify as participants for this study, employees (a) could not be burdened by the study procedures, (b) could not have received benefits from the research, and (c) must have been members of the population. Eligible research participants had the knowledge and experience to participate and the ability to understand the context of informed consent (Wallace &

Sheldon, 2015). The participants had knowledge of employee technostress and technological self-efficacy as it relates to employee productivity to respond to the survey questions.

My strategy for gaining access to study participants was to administer an online survey. Online survey programs can help researchers (a) gain access to participants, (b) increase respondents' openness, and (c) increase levels of convenience and engagement (Van der Zijpp et al., 2016). Also, online survey providers might increase the participation rate within research studies (Zopiatis, Constanti, & Theocharous, 2014). Further, I engaged the assistance of an online survey consultant, whose work might improve access to the population of participants and increase the number of responses in the study (Bhatnagar, 2014). The online survey consultant provided an e-mail to participants and invited members to participate.

My strategy to establish a working relationship with study participants was to (a) create a respectful relationship with the online consultants and (b) establish a valid consent process that established trust. Van der Zijpp et al. (2016) noted that a respectful relationship between a researcher and a consultant promotes increased participation. Establishing trust in an online working relationship with participants required the use of an informed consent protocol as a valid method recognized by ethics committee members (Short, Toffel, & Hugill, 2016). I developed a working relationship with a Qualtics consultant to eliminate the need for me to have any direct contact with study participants. I randomly sampled 15 companies and randomly selected 10 employees from each

company in the state of Florida through Qualtics with an introductory letter and an informed consent form for employees to submit online.

Research Method and Design

Research Method

For this study, the quantitative methodology was appropriate because it elicited quantifiable, rigorous, generalized data, and outcomes were result-driven and based on statistical evidence (Brannen, 2017). A quantitative method accommodates acceptance or rejection of a hypothesis (Smartt & Ferreira, 2014). A quantitative method was appropriate to (a) examine the relationship between variables, (b) test a theory by numeric data, and (c) test variable relationships (Tarhan & Yilmaz, 2014). For the study, I gathered and analyzed data from a randomly sampled population to test a hypothesis regarding the relationships between the variables. To convert the ordinal data to interval data, I used a type of item response Mmdel (IRM). Based on the item response theory, the paradigm was a way to measure abilities, attitudes, or other variables (Joshi, Kale, Chandel, & Pal, 2015).

The quantitative method was appropriate for the study to examine the relationship between the independent variable (technostress), the mediating variable (technological self-efficacy), and the dependent variable (employee productivity). Alternative methods for studying technostress, technological self-efficacy, and employee productivity included qualitative and mixed methods. The qualitative method is an analysis of embodied lived experiences wherein the researcher seeks to understand the self-inspection of the participants' behaviors and actions (López, Callao, & Ruisánchez,

2015). The qualitative method involved the researcher's emphasis on the participants' points of view and observations as they describe the phenomena (Sreenu, 2017). A mixed methodology was appropriate to collect comprehensive data to gain a better understanding of the topic and increase the generalizability of the results in a quantitative element (Lucero et al., 2018).

According to Venkatesh et al. (2016), a researcher must use mixed methods to converge or validate results from different methods. A mixed methods study was an expansion of quantitative and qualitative components used for achieve comprehensive results between the two methods (Zhang & Watanabe-Galloway, 2014). A qualitative method was not appropriate for this study because this method did not allow for observations and descriptions to be counted, measured, and qualitative methods did not offer statistical validation. A mixed methods approach was not appropriate for the study because of the inclusion of a qualitative element.

Research Design

For this study, I chose a correlational research design that included the Pearson correlation coefficient (*r*) and Likert-scale data. Subedi (2016) noted that Likert-scale data is necessary for measuring attitudes or opinions and understanding character traits when using data analysis procedures of a correlational design with Pearson's *r*. According to Prion and Haerling (2014), the use of a correlational design with Pearson's *r* allows for establishing a linear relationship between two variables and determining the strength of the variables. The appropriate design for examining the relationship between the independent variables of technostress, the mediating variable of technological self-

efficacy, and the dependent variable of employee productivity was a correlational research design utilizing Pearson's *r*.

The alternative design choices are quasi-experimental and experimental quantitative designs. The quasi-experimental design was not appropriate for this study. Poirier, Staub-French, and Forgues (2015) indicated that a quasi-experimental design was useful for identifying a comparison group similar to the treatment group regarding baseline (pre-intervention) characteristics. The quasi-experimental design was not random, and the mechanism was to manipulate the design to cause an effect on the dependent variable (Zakharov, Tsheko, & Carnoy, 2016). Seeking a cause-and-effect relationship was irrelevant to this study.

An experimental design was also inappropriate for this study. Henretty, Currier, Berman, and Levitt (2014) noted that experimental designs are useful for examining the effects of random participants assigned to control groups. Callao (2014) suggested that researchers use an experimental design to manipulate, control, and randomize participants. Yaripour, Shariatinia, Sahebdelfar, and Irandoukht (2015) acknowledged that experimental designs are suitable to manipulate test variables through treatment or interventions. For this study, an experimental design was not appropriate because the manipulation of test variables was not used to measure any potential results. The best-suited research design was the correlational quantitative design.

Population and Sampling

The study sample consisted of 112 retail supply-chain employees who lived in the state of Florida, as determined by a G*Power analysis. Eligible employees of 15 retail

companies received an invitation to participate in the study through e-mail. The population consisted of 112 participants who were 18 years or older. Lu, Zhao, and While (2019) concluded that managerial support predicts positive employee productivity among retail supply chain employees. Tüzün, Çetin, and Basim (2014) noted that managing an employee's productivity occupies a statistically significant relationship with the organization. The participants selected from the population had knowledge and awareness of their abilities to adequately answer the research question.

The sampling method for this study was probabilistic random sampling, a method likely to expose the phenomenon of technostress. According to Mathieson (2014), probabilistic random sampling methods allow for all members of a population to have an equal opportunity to be selected, resulting in a representative sample. Probability sampling was (a) random, (b) fixed and known, (c) conclusive, (d) unbiased, (e) objective, (f) statistical, and (g) tested (Catania, Dolcini, Orellana, & Narayanan, 2015).

Probabilistic sampling offered both strengths and weaknesses. The strengths of probabilistic sampling included that it was cost and time effective, an easy way to collect data, and ideal for online surveys (Erens et al., 2014). Probabilistic sampling is acceptable for research that represents a population because it ensures selection of a varied sample (Stern, Bilgen, & Dillman, 2014). I used this sampling method to engage participants who had been exposed to the type of environment that would create the phenomenon of technostress in the retail supply industry. Catania et al. (2015) stated probabilistic sampling is fundamental and allows the researcher to validate the data without generalizing the sample design while achieving accuracy.

Weaknesses of probabilistic sampling, according to Stern et al. (2014), included chances of selecting a specific class of samples only. Redundancy and monotonous work was another weakness of probabilistic sampling; monotony was possible because the researcher repeated the questions with every participant. Therefore, the effectiveness of the system may have been reduced (Stern et al., 2014). Finally, probabilistic sampling was time-consuming and tedious, and no single list detailed the population of choice (Stern et al., 2014).

The specific subcategory of probabilistic sampling for this study was random sampling. Random sampling was the best method to fairly select a sample from a given population because every member had an equal opportunity of being selected (Wilson, 2014). The strengths of random sampling included (a) the potential for the entire target population to have an equal chance of being selected, (b) its appropriateness for selecting the sample from a population of interest, and (c) the potential to eliminate sampling bias (Mathieson, 2014). Another strength of random sampling was the ease of use and the accurate representation of the larger population (Dutwin & Buskirk, 2017). The use of a random sample enabled accurate extraction of representatives from a larger population, which was critical for making inferences and generalizations regarding relationships between variables (Catania et al., 2015).

The use of random sampling posed potential weaknesses. A random sample works best if the population is available and complete (Mathieson, 2014). Even if a list of potential participants were readily available, it would be challenging to gain access to the list (Hays, Liu, & Kapteyn, 2015). The list may be protected by privacy policies, and a

researcher could navigate a lengthy process to attain permission. Other weaknesses of random sampling included the expense and time required to contact human populations, even when a list is available (Quan et al., 2014). However, random sampling was necessary because it supported the assumption that the distribution of the phenomena was normal across the population (Buonocore, Russo, & Ferrara, 2015).

G*Power was the appropriate statistical design for social and behavioral use, and conducting a priori sample size analysis was adequate for correlational and regressional studies (Nieuwenstein et al., 2015). Achieving the appropriate sample size was necessary to support (a) interpretation of the issues, (b) alignment with particular research designs, and (c) accurate power levels (Fugard & Potts, 2015). The appropriate sample size also helped ensure accuracy and control of bias (Schoemann, Bouton, & Short, 2017). An appropriate sample size controlled the chances of Type I and Type II errors within the desired levels of effect size, power, and confidence (Greenland et al., 2016).

Therefore, I used a G*Power version 3.1.9.2 power analysis to determine the appropriate sample size for this study. *A priori* analysis with an effect size of $f = .15$ and $\alpha = .05$ indicated a minimum sample size of 107 participants to achieve a power of .80. Collecting 150 surveys would have increased the power to .99; therefore, the goal for sample size was between 107 and 150 participants. The use of adequate effect size, alpha level, and power level were necessary to produce valid results. The use of an effect size of .15, an alpha level of .05, and power level of .80 allowed for a balance of Type I and Type II errors (Cohen, 1992).

Ethical Research

An informed consent process protected participants in this study. The elements of the informed consent document were (a) a determination of study participants' ability to consent, (b) an explanation of the voluntary nature of participation, (c) a description of the reasons for conducting the study, (d) a discussion of the risks and benefits of the study, (e) an outline of time restraints, and (f) a description of the procedures of conducting the study (Benchoufi, Porcher, & Ravaud, 2018). I sent an introduction letter to each prospective member, introducing myself and the topic and issuing an invitation to take the survey. Benchoufi et al. (2018) noted that researchers must adhere to ethical research practices to allow potential study participants to confirm their decision to participate and sign a consent form before the start of the data collection.

Harriss and Atkinson (2015) asserted that each study participant might withdraw from the research at any time. The study participants received an informed consent letter to explain the options for withdrawing from the study: (a) negative response to the informed consent form, (b) nonresponse to the questions, or (c) exiting the survey website. Yardley, Watts, Pearson, and Richardson (2014) indicated that a researcher might ethically exterminate any unused data if that action is not an attempt to mislead or violate the policies. I annulled any data collected from survey participants who subsequently withdrew from the study.

Ossemane, Moon, Were, and Heitman (2017) suggested that compensation for the research study participants had the potential to mislead or influence their decisions and responses. The purpose of the study was to gather direct knowledge from participants of

employees from retail organizations; therefore, no study participants received an incentive or compensation for survey completion.

I developed policies and procedures to ethically minimize misuse including (a) using an informed consent letter, (b) taking care to avoid violations of surveying populations, and (c) not offering compensation to participants. Ossemane et al. (2017) noted that researchers must assure the ethical protection through full disclosure, confidentiality, and provision of informed consent procedures. Hammersley and Traianou (2014) presented the informed consent as an assurance of participants' autonomy and ethical protection. Lowry, D'Arcy, Hammer, and Moody (2016) reported that online surveys assure ethical protection and anonymity for participants.

I stored raw data, results, and encrypted password protection on a USB drive in a fireproof safe and will continue to do so for five years following completion of the study to protect the confidentiality of participants. I conducted this study upon receipt of approval from Walden University's IRB. I protected the anonymity of participants online survey by disabling the cookie-collection function from recording personal identity.

Data Collection Instruments

To measure the independent variable of employee technostress, I used Torkzadeh and Doll's (1999) instrument Information Technology Works (ITW; Appendix A). The ITW contains five questions that cover five decisions related to employee technostress. The request and permission to use the ITW appear in Appendixes B and C. To measure the mediating variable, adaptation of technological self-efficacy, participants completed Schwarzer and Jerusalem's (1995) Survey Scales for Generalized Self-Efficacy (SSGS;

Appendix D). The adapted SSGS survey contains 10 questions covering five constructs of mediating technological self-efficacy (Tarafdar et al., 2010). The request and consent to use the SSGS appear in Appendixes B and C. To measure the dependent variable of employee productivity, I used Tarafdar and Roy's (2003) Survey Scales for Employee Productivity (SSEP, Appendix E) within the context of technology and technostress. Data from the calendar year 2017 were useful for measuring the dependent variable, employee productivity. Raw data is available by request from the researcher.

The ITW survey used a 10-point Likert-type scale to collect ordinal data for technostress as participants indicated whether they agreed or disagreed with each item (Tarafdar et al., 2010). The ITW survey was appropriate for use in this study because of its applicability for measuring an employee's level of technostress using complex technology (Tarafdar et al., 2010). The validity of the ITW against technostress complexity using convergent validity ranged from .61 to .80 for equivalent subscales, and the validity of the ITW against technostress complexity using discriminant validity for the equivalent subscales ranged from .11 to .59. Published data indicated the ITW is a valid and reliable way of examining a wide range of technology usage with a coefficient alpha of .91. A test-retest indicated reliability with a coefficient alpha of .75 for the total scale (Tarafdar et al., 2010). The data implied that the use of the ITW had implications for retail employees and that a correlation existed between technostress and employee productivity, mediated by technological self-efficacy.

The survey for generalized self-efficacy measured the technological piece of self-efficacy by examining five constructs (Tarafdar et al., 2010). The constructs for

measuring technostress occurred on a 10-point scale, and participants indicated their level of agreement with each statement. A response of 1 indicated *strong disagreement* and 10 indicated *strong agreement*. The five dimension statements on the technostress scale were (a) I do not know enough about work-related technology to handle my job satisfactorily, (b) I need a long time to understand and use new work-related technology, (c) I do not have enough time to enhance and study my technology skills, (d) I find new recruits more knowledgeable about computer technology than I am, and (e) I often find it too complex to understand new work-related technologies.

The 10 items on the technological self-efficacy scale were (a) I manage and solve technology problems always if I try hard; (b) If I have problems with the technology, I can always find a way to get what I need and want; (c) Using technology at work allows me to accomplish my goals; (d) I am confident when dealing efficiently with unexpected technology events; (e) My technology knowledge was resourceful when handling unforeseen situations; (h) I can resolve most technology issues if I invest the necessary effort; (i) I utilize my coping strategies in order to remain calm when facing technology difficulties; (j) When faced with technological problems, I can obtain several solutions; (k) I usually can find a good solution when my technology is not working; and (l) I am capable of handling whatever comes my way when it comes to technology. This scale measured the foundational theory used in this study.

Evaluating employee productivity required an assessment of competencies of employees and their evaluation of outputs at a specific period (von Bonsdorff, Janhonen, Zhou, & Vanhala, 2015). In this study, I administered Tarafdar et al.'s (2007) Employee

Productivity Scale. Tarafdar and Roy (2003) developed the Employee Productivity Scale within the context of technology and technostress. The employee ICT-related productivity scale has four items: (a) The technology helps to improve the quality of my work, (b) The technology helps to improve my productivity, (c) The technology helps me to accomplish more work than would otherwise be possible, and (d) The technology helps me to perform my job better (Tarafdar & Roy, 2003). Respondents answered each item by selecting a value on a Likert-type scale, wherein 1 = *disagree strongly* to 10 = *agree strongly* (Tarafdar & Roy, 2003).

Combining the surveys into a single cohesive survey instrument allowed for self-administration in an online survey format via Qualtrics. The use of Qualtrics to collect online survey data allowed for (a) collecting data across different age groups (Fink, 2015), (b) tabulating data and processing the statistical results (Helms, Gardner, & McInnes, 2017), and (c) leveraging a low-cost method of collecting preceptions of a sampled study (Phillips, 2015). Scoring of the scales yielded an absolute summed approach for the individual questions on a Likert-type scale to represent the context of technology, technostress, and productivity (Tarafdar et al., 2007). Scoring for any negatively worded questions received reverse data coding. The sum of the four items created the full-scale score. The full-scale scores ranged from 4 to 40 points with a higher score denoting a higher degree (Tarafdar et al., 2007).

The survey for general self-efficacy was a valid survey instrument for determining an employee's level of technological self-efficacy. Tarafdar et al. (2010) described the use of discriminant and convergent validity and the survey of general self-

efficacy against Harrison and Rainer (1992) as valid. Tarafdar et al. (2010) outlined a convergent validity correlation of .95 between the survey for general self-efficacy and the tested population, and discriminant validity between the survey for general self-efficacy ranged from .56 to .62, indicating the survey of general self-efficacy was distinct. The published internal consistency reliability of the general self-efficacy survey, computed with a coefficient alpha, was .88 (Tarafdar et al., 2010).

The demographic questions solicited information about participants' gender, age, educational level, and industry associated with their retail supply-chain job function. A factor analysis procedure for reliability and scale validation of Cronbach's coefficient alpha ranged from 0.71 to 0.91 (Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2011) and established the validity of the demographic variables. The retail supply-chain organizations employees provided data about productivity through Qualtrics. I collected organizational data from retail supply-chain organizations and stored the data electronically. I provided the data, upon request, to Walden University, the retail supply-chain group that granted access for the study, and to researchers interested in pursuing further research or data verification.

The strategy for addressing validity was to construct validity as a measurement of the data collection instruments for collecting data that relates to the independent and mediating variable technostress and technological self-efficacy. The use of construct validity enabled the instrument's measurements of true constructs to produce criterion validity (Zamanzadeh et al., 2015). According to Neumann and Pardini (2014), the use of construct validity allows for inferences between the study's variables and the theoretical

study. Huijg, Gebhardt, Crone, Dusseldorp, and Presseau (2014) disclosed that the use of construct validity mediates whether or not an item measures the intended group.

The strategy for addressing reliability within the study was to use the internal consistency scale. According to Clow and James (2014), Cronbach's alpha was a useful internal consistency test for scales used in previous research and a useful mediator for recognizing good measurements of constructs. Cronbach's alpha was the most commonly and widely used method for addressing reliability in studies that involve attitudes and perceptions (Dunn, Baguley, & Brunsden, 2014). To ensure the survey instruments were both valid and reliable, I did not make any adjustments or revisions to any of the survey instruments.

Data Collection Technique

For the study, data collection took place via a self-examined online survey administered via Qualtrics platform. The resulting ordinal data set could be further analyzed using a non-parametric technique such as a Chi Square method to test a hypothesis regarding the independent variables of technostress and technological self-efficacy and the dependent variable of employee productivity. The use of a online survey was (a) suitable for measuring perceptions in large populations (Fulgoni, 2014), (b) a comparative mode of evaluating opinions in retail management (Phillips, 2015), and (c) widely used as an instrument for administering quantitative research (Muzi, Junyi, & Gaojun, 2015). The use of a Qualtrics platform (a) allowed access to a broad population (Fink, 2015), (b) benefitted socially related research applications (Lu et al., 2019), and (c) was an effective and efficient online survey that minimized cost (Phillips, 2015). The use

of a secondary online survey, via Qualtrics, was appropriate to obtain ordinal data from a population to test a hypothesis regarding the relationship between the identified variables of the application.

I used the Qualtrics platform to retrieve the data of retail supply-chain employees from different organizations. The distribution of a consent form to all locations of retail employees served as a means of introduction and instruction along with the conveyance of the Qualtrics platform URL to a random sample of retail employees of 15 retail supply-chains in Florida. The process of working with a Qualtrics platform consultant online was an effective way of collecting information related to technostress, technological self-efficacy, and employee productivity (Tarafdar et al., 2010). Participants of the study were able to access the survey from any computer device including a smartphone at a location of their choice.

The Qualtrics platform offered a professional account with unlimited services that included unlimited questions, unlimited responses, data integration into SPSS for analysis, and question randomization. I maintained the survey site for 30 days. Upon the close of the 30-day survey response period, I downloaded the data into SPSS for analysis. I collected data for technostress using the 10-point Likert intervals to determine an accurate total survey score (Bhatnagar, 2014).

The use of online surveys within the study was an advantage over other data collection methods. Self-examined online surveys, when compared to other data collection methods, (a) elicit higher levels of honesty in participants (Helms et al., 2017), (b) offer a higher level of convenience (Christensen, Ekholm, Glümer, & Juel, 2014), and

(c) yield a more affordable survey (Phillips, 2015). Online surveys also allow for (a) availability of a larger population within a short period to collect valid and reliable data (Hox, De Leeuw, & Zijlmans, 2015), (b) collection of reliable data that is comparable to other techniques (Cardamone, Eboli, & Mazzulla, 2014), and (c) downloading data into statistical software (SPSS; Phillips, 2015). The use of self-examined online surveys was an advantage; however, disadvantages were also possible.

The disadvantages of using self-examined online surveys included impacts on response rates and generalizability. An influx of online survey use could reduce the number of questionnaires and surveys (Hox et al., 2015), resulting in a minimal response rate, unlike other data collection methods (Christensen et al., 2014) and present a higher risk of nonresponse rate for each item (Cardamone et al., 2014). An online survey environment might (a) yield an increase in biased responses (Shapka, Domene, Khan, & Yang, 2016), (b) minimize generalizability (Christensen et al., 2014), and (c) result in greater levels of statistical data contamination and reduce the researcher's ability to achieve a consistent representation of the population (Muzi et al., 2015). The ability to retrieve honest feedback regarding technostress and technological self-efficacy in a cost-effective and reliable approach, while accepting that a minimum level of generalizability existed, indicated that a self-examined online survey was appropriate for the study.

No pilot study was necessary for this study. Pilot studies are required when validated structured questionnaires are nonexistent (Aristidis, 2015) or greater future projects for research are necessary for planning (Williams, Cafarella, Paquet, & Frith, 2015). Previous researchers who examined the relationship between independent

variables of technostress and technological self-efficacy and the dependent variable of employee productivity validated and confirmed the reliability of the survey questionnaire (Tarafdar et al., 2010). Therefore, data collection proceeded without a pilot study.

Data Analysis

The following research question guided this study: Is there a statistically significant relationship between employee technostress and employee productivity, and if so, is this relationship mediated by technological self-efficacy? The following hypotheses further shaped this study:

- $H1_0$: There is no statistically significant relationship between employee technostress and employee productivity, and if so, is this relationship mediated by technological self-efficacy?
- $H1_A$: There is a statistically significant relationship between employee technostress and employee productivity, and this relationship is mediated by technological self-efficacy.
- $H2_0$: Technological self-efficacy does not mediate the relationship between supply-chain managers' technostress and employee productivity.
- $H2_A$: Technological self-efficacy mediates the relationship between supply-chain managers' technostress and employee productivity.

To answer the central research question of this study using a correlational design, I conducted a multiple linear regression analysis to determine whether a linear relationship existed between employee technostress and employee productivity, mediated by technological self-efficacy. I treated the ordinal data from Likert-type survey

questions to analyze the predictor variables of employee productivity with a correlational analysis. For statistical purposes, the variable was assumed as interval variables and equally spread. For example, a 5-point Likert scale with interval values of *strongly agreed, agreed, neutral, disagreed,* and *strongly disagreed* is commonly used to measure attitudes providing a range of responses from 1 to 5 with a rank order. To convert the ordinal data to interval data, I employed an IRM. Based on the item response theory, researchers use the paradigm to measure abilities, attitudes, or other variables (Joshi et al., 2015).

Classifying ordinal variables was sufficient to reduce bias and allow for interpretation of data when using Likert-type questions of five or more categories (Norman, 2010) and sample sizes higher than 29 (Johnson & Creech, 1983). The use of correlational analysis was appropriate because (a) Pearson's *r* was an induced variable (Subedi, 2016), (b) the goal was to establish a relationship between more than two variables (Dong, Lin, & He, 2017), and (c) another goal was interpreting the relationship of more than one predictor variable and an interminable dependent variable. The use of partial correlations and linear testing relationships controlled the effects of additional variables in the hypotheses (Keith, 2014) and inducing significant levels for each variable (Cohen, 1992).

The alternate method of statistical analysis (analysis of variance [ANOVA]) was not appropriate for the study. The ANOVA method required determination of the acceptance or rejection of hypotheses when different groups of two or more are involved (Bikas, Stavropoulos, & Chryssolouris, 2016). ANOVA introduced a difference between

the means of populations or groups. Thus, Bejami, Gharavian, and Charkari (2014) noted that ANOVA is suitable for substantiating a difference between the means of constructs within the independent variable or a difference between the means of the population and the dependent variable. Therefore, ANOVA was not appropriate for the study because the expectation was to determine a relationship between groups and not variations between groups.

A correlational analysis was appropriate for this study because the focus was a variable relationship that allowed for statistical analysis, as aligned with the stress studies of Moksnes, Moljord, Espnes, and Byrne (2010). In a quantitative correlational study, Ragu-Nathan et al. (2008) examined variable relationships between technological self-efficacy, technostress, and job satisfaction. Managers of organizations can use point predictions models to deduce the level of employee productivity. As noted by Hauser (1963), a correlational analysis is a method used to study the strength of a relationship between two measured variables that are significant and may present a better understanding of the events.

The alternate method of logistic regression was also inappropriate for the study. Logistic regression models are useful to predict categorical outcomes of multiple dependent variables (Sperandei, 2014). A statistical method like logistic regression is useful to estimate approximate levels of nonlinear curves (Narbaev & De Marco, 2014). Logistic regression methods allow for the probability of a good fit (D. Liu, Li, & Liang, 2014). Logistic regression was not appropriate for this attempt to examine the relationships between technostress, technological self-efficacy, and employee

productivity because the aim of this research was to illuminate the relationship with a single dependent variable.

I maintained clean data within the study by (a) concentrating on the accuracy and quality of research, (b) ensuring the questionnaires' values are calculated precisely within the survey constraints, (c) checking for value extremities, and (d) ensuring data conformability. Cleaning data ensures the components of the quantitative research of future decisions are verifiable, eliminates threats to validity, and ensures generalizability (Bhattacharjee, Chatterjee, Shaw, & Chakraborty, 2014). I cleaned and screened data to ensure quality research, check for extreme values, and look for missing data and unusual data patterns. The process for data cleaning and screening included identifying and analyzing data inconsistencies and frequency distributions of graphs and tables (Xu et al., 2015).

I used a mean score replacement to address the issues of missing data through data cleaning. Missing data is an issue that undermines the research and precludes adequate compensation (Singhal & Rana, 2014). Missing data compromises data and analytical interpretation (Van Ginkel, Kroonenberg, & Kiers, 2014). When several facets within a construct are missing, the sum of the score for the remaining facets divided by the number of items scored within that construct can be substituted for the facet of the missing item (Singhal & Rana, 2014). Calculating a mean for a single item construct within the survey was not possible, and missing data and mistakes in the construct would have worsened the performance and invalidated the questionnaires (Bhattacharjee et al.,

2014). The use of a mean score replacement was a way to salvage invalid questionnaires missing two or more facets of constructs.

The assumptions about the statistical analysis are homoscedasticity, multicollinearity, linearity, and normal distribution. Any violations of assumptions of homoscedasticity could result in a standard bias error (Korany, Abdine, Ragab, & Aborass, 2016). According to Yu, Jiang, and Land (2015), violating the assumption of multicollinearity might not provide the results needed to create numerical instability as valid. Violating the assumptions of linearity and normal distribution can lead to biased forecasts and confidence intervals within the correlation analysis (Dong et al., 2017). I used an analytical system to test and assess that no violations of assumptions occurred within the study of the statistical analysis.

I figured the calculations of the variance inflation factor (VIF) to test for and assess the assumption violations of skewness, kurtosis, and the normal probability plot (P-P) of regression and scatterplots of standardized residuals. The appropriate reactions if the assumptions are violated are to analyze the multiple linear regression are homoscedasticity, linearity, normality, and independent of the residuals (Dong et al., 2017). Calculating the VIF of predictor variables and the use of a cutoff value of 10 eliminated redundant features (Yu et al., 2015). The methods for assessing linearity included constructing scatter diagrams, identifying *z*-scores within a range of zero plus or minus three, and examining the data for extreme values (Dong et al., 2017).

The regression model was appropriate when the normal probability plots of the residuals formed a standard straight line with no obvious pattern exits among the plots of

the regression model (Yuvaraj & Pradeep Kumar, 2017). When assumptions are violated or absent, the *F* test was appropriate for this study. Within the study, I (a) calculated the VIF for predictor variables to test for multicollinearity and (b) tested for homoscedasticity, linearity, normality, and independence of residuals for scatterplot, standardized residuals, a normal probability (P-P) plot of the regression model, and verified skewness and kurtosis coefficients to ensure ranges fell within the range +/-1.

A violation of homoscedasticity can occur when data points are clustered on a residual scatter plot (Dong et al., 2017). A violation of linearity may exist when patterns are present, and normality violations exist when significant deviations are evident in a normal distribution curve (Dong et al., 2017). To achieve robust test results and correct for violation of homogeneity of variance, I applied logarithmic transformation in conjunction with bootstrapping (Field & Wilcox, 2017). A violation of multicollinearity, indicated by a VIF of 10 or more, required interpreting the data or the use of stepwise multivariate logistic regression within the specific model (X. Liu et al., 2016). Violations of linearity, *Z*-scores outside the range of 0±3, or noted outliers in scatter diagrams necessitated the exclusion of those data points within the analysis (Dong et al., 2017). According to Ernst and Albers (2017), the corrections for an assumption of normality violation were not required for correlation analysis with a central limit theorem. Correlation analysis is trustworthy for large populations greater than 30 (Ernst & Albers, 2017), even when data is missing or in the presence of abnormal distribution (Žliobaite, Hollmèn, & Junninen, 2014). I did not find violations of homoscedasticity, multicollinearity, linearity, or normality that required corrections.

I interpreted inferential results by using the Pearson's product-moment correlation coefficients for the study. The Pearson's product-moment correlation coefficient value range of -1 was a variable negative movement in the opposite direction and +1 was a positive variable movement in the same direction (Puth, Neuhäuser, & Ruxton, 2014). The value of *r* was indicative of the scatter measured around the trend line and not of the gradient, where the absolute value was higher than the relationship between the two variables are stronger (Puth et al., 2014). A zero value for *r* in the study indicated neither increases nor decreases in the independent or dependent variables. The results of a Pearson's product moment correlation indicate an alpha level of .05 interpreted as 0-.20 is negligible, .21-.35 is unstable, .36 -.67 is level, .68 -.90 is strong, and .91- 1.00 is very strong (Prion & Haerling, 2014). I interpreted the correlation coefficients and determined if the effect size was negligible, unstable, level, strong, or very strong.

I interpreted the statistical significance within a correlational analysis and used an appropriate alpha level and confidence interval to show if a relationship came from a Type I error or a nonexistant effect. I combined partial correlations with the Bonferroni approach to control Type I errors within the study. The Bonferroni approach is an effective means to validate correlation confidence intervals (Fitzmaurice et al., 2014). The Bonferroni approach uses controls for false positive results and Type I errors (Glickman, Rao, & Schultz, 2014). Interpreting correlations using the Bonferroni approach of the linear equation required a *p*-value of less than .017(.05/3 = .017) to note a statistical significance.

A statistical significance of the correlational analysis was appropriate for testing a Type I error. The confidence level of 95% is the accepted standard for published data (Norman, 2010). A 95% level of confidence indicates the value of the population is a true means of the total population, and an alpha level of 5% and a confidence interval of 95% with a 5% chance exists of rejecting the null hypothesis (Ernst & Albers, 2017). The use of confidence intervals and power analysis minimized he chance of a Type II error, and a failure to identify a real effect was nonexistant (Cohen, 1992; Ernst & Albers, 2017). I avoided Type I and Type II errors by using Bonferroni calculated *p*-values of less than .017 and included a statistical significance interpretations of correlational analysis are accurate by using an alpha level of .05, and confidence interval of 95%.

The correlational design for the study is a required program that can handle computations. I used an SPSS™ statistical software version 21 for analyzing data. The statistical software was a tool used to analyze and produce statistical outputs, test, graphs, and charts (Moura, Orgambídez-Ramos, & Gonçalves, 2014). Moura et al. (2014) used the SPSS™ for correlational analysis and utilizing quantitative questionnaire methods. The benefit of SPSS™ computation allows for examining the relationship in quantitative research.

The SPSS™ software package was suitable for the study of antecedents of employee technostress and employee productivity correlational analysis mediated by technological self-efficacy (Casimir, Ng, Wang, & Ooi, 2014). Munyewende, Rispel, and Chirwa (2014) found SPSS™ is beneficial for performing complex correlations on performance. Testing for bivariate correlations allowed for examining relationships

between employee technostress, employee productivity, and technological self-efficacy in retail locations in Florida.

Study Validity

Venkatesh et al. (2016) noted that no instrument is completely valid; therefore, the validity must be measured in degrees. The process to validate the accuracy of an instrument involved collecting and analyzing data without regard for the user (Clow & James, 2014), which might have involved a pilot test. Nevertheless, a variety of threats arose within the research process, which could have hindered the validity of the application. The ultimate goal of every researcher is to know the true answer to the research questions. The methods, data, or results of a study cannot determine the validity of the study. According to Venkatesh et al. (2016), validity is the approximate certainty of the reality and truth of an inference, generalization, or knowledge claim. For purposes of this study, inference and generalization took broad and general definitions to encompass interpretations, clarifications, and generalizations.

The goal was to minimize threats to external validity while maximizing the research design and analysis. According to Sreena (2017), external validity is the capacity to transfer conclusions to other populations. One way to increase external validity is to use real-life settings. I asked participants within the community to provide real-life answers to survey questions through Qualtrics. Another possible threat to validity was the participants' dishonesty in responding to the survey. To mitigate that threat, I continuously reminded the survey respondents that the responses were anonymous, and no potentially identifying information would be included in the survey questions;

therefore, they could incur no risk associated with sharing their honest responses to all questions.

I addressed threats to external validity related to participants within a retail population of 10 locations across a large metropolitan market by using tested and reliable survey instruments. Increasing the diversity of the population and their environment enhanced external validity of participants' settings (Fitzgerald, Bean, & Ruberu, 2017). Other possible threats to external validity, as suggested by Sreena (2017), included population bias and the interchange effect between the environment and the independent variables. Population bias can threaten the random sampling and the external validity (Tarhan & Yilmaz, 2014). The restraints of the study included (a) factors of time, (b) the setting, (c) nonrandom sampling, and (d) the nonpopulation bias.

I addressed the external threats to external validity by utilizing a second sample of participants within retail organizations of 15 markets and using reliable survey instruments. The diversity of the sample and the environment helped improve the external validity of participants' influence (Fitzgerald et al., 2017). The use of large, diverse population helped reduce environmental validity factors (Curcuruto, Mearns, & Mariani, 2016), and increasing the population sample size strengthened the capacity to generalize the findings to similar populations (Tarhan & Yilmaz, 2014). Alpha levels greater than .60 minimized the threat of external validity and increased the predictability within study populations (Cho & Kim, 2015). The use of a survey instrument with a high reliability, an alpha level of .71 or .88, and a large, diverse population indicated minimal

threats to external validity (Fitzgerald et al., 2017). The internal validity of the study allowed the researcher to draw conclusions with accuracy (Sreena, 2017).

Threats to internal validity are biases that might include (a) previous designs that skew judgment, (b) bias allotment, and (c) personality traits that disrupt the results (Henderson et al., 2015). Internal validity might create assumptions of independent variable changes that lead to changes in the dependent variable (Barry, Chaney, Piazza-Gardner, & Chavarria, 2014). Nonrandom sampling did not allow for control of participants. I collected data from a selected sample; however, the ability to manage nonresponse bias did not exist within the sample. The ability to determine if the participants made a significant difference may not be determined if the participants' selected population does not exist.

The use of valid statistical tests and survey instruments helped control the threats to internal validity. Sant'Anna and Song (2019) pointed out that selection bias in nonrandom study designs cannot be eliminated, but the propensity score matching (PSM) and covariate analysis could minimize bias selection related to the behaviors of participants. Controlling for PSM was not possible for this study; therefore, selection bias was an impediment to generalizability. To fully eliminate any negative historical participation was unlikely; however, Barry et al. (2014) noted that participants from similar work experiences might show an increase in parallel histories. Threats to internal validity occurred throughout the design process; however, Barry et al. added that reliable instruments might help minimize the threats and enhance the study results. To minimize

the threats to internal validity for this study, I used (a) one survey design, (b) participants from similar work areas, and (c) reliable instruments.

Statistical conclusion validity is the degree of concluding a correct or reasonable relationship among variables based on data and is a factor that can affect Type I and Type II errors. The failure to control Type I and Type II error rates were threats to the validity of statistical conclusions; use of the following measures mitigated this risk: (a) credible survey instrument, (b) statistical test observation, and (c) a compatible sample size (Lepp, Barkley, & Karpinski, 2014). The following factors affected the validity of statistical conclusions and the quality of research: (a) use of unreliable and invalid survey instruments, (b) violations of data assumptions, and (c) use of limited sample size (Venkatesh et al., 2016). The following measures minimized the threats to statistical conclusion validity: (a) a larger size sample, (b) valid instruments, and (c) appropriate statistical tests (Rutkowski & Delandshere, 2016). I used appropriate survey instruments and acceptable size samples of the population to minimize the threat of violating data assumptions and impacting the validity of statistical conclusions.

Dunn et al. (2014) noted that the use of Cronbach's alpha coefficient computations with the survey instruments and the internal consistency check against my population sample of the standard of >.70 would allow for reliability. Bonett and Wright (2014) indicated that comparing Cronbach's alpha results from previously used survey instruments is a valid way to determine the reliability of an instrument. Dunn et al. (2014) suggested that Cronbach's alpha is a popular and valid way to measure the reliability of an instrument. Clow and James (2014) noted that the use of Cronbach's alpha to test

instruments is reliable and acceptable for verifying the validity of construct measurements.

Violations of the assumptions of homoscedasticity, linearity, and normal distribution constituted a threat to the study's statistical results and validity. Therefore, a standard error bias could have violated the results of the data assumption of homoscedasticity (Korany et al., 2016). Dong et al. (2017) presented evidence of data that had violated the assumptions of linearity, and normal distribution had led to misleading and biased confidence intervals. To minimize the risk of these errors, I tested for assumption violations using the probability plot of the regression standard, scatterplots standards, and analysis of skewness and kurtosis coefficients levels. Y. Wang et al. (2017) indicated that conducting a correlational analysis using a normal probability plot, regression residuals, and scatterplots was efficient to induce homoscedasticity, linearity, and normality.

A sufficient sample size strengthened the statistical validity results. Insufficient sample size may increase the probability of creating a Type I error (Anthoine, Moret, Regnault, Sébille, & Hardouin, 2014). Further, sampling a small percentage of the population could increase Type II errors (Cohen, 1992; Ernst & Albers, 2017). Therefore, I used G*Power analysis to ensure an appropriate sample size. Anthoine et al. (2014) suggested that lowering the alpha from .05 to .01 and increasing the sample size may minimize the chance of a Type I error. Increasing the power level to .99, beyond the nominal power level of .80, may increase research accuracy, according to Egbewale, Lewis, and Sim (2014). Thus, achieving a sample population between 107 and 150

minimized the chances of creating a Type I or Type II error, increased accuracy, and strengthened the study's results.

Summary and Transition

In Section 2, I addressed the nature and structure of the research study, clarified the role of the researcher, described the participants, and outlined the research method and design. Additionally, I provided the purpose for the study to understand if there is a relationship between technostress, technological self-efficacy, and employee productivity in the retail supply chain organization. I provided justification for the selection of the population and sampling method, a description of the survey instrument, techniques, and analysis methods. I outlined developing a working relationship with Qualtics to eliminate any direct contact with participants. I chose a correlational quantitative design and surveyed 15 retail companies anonomouly. I demonstrated how to calculate the sample size using an empirical statisical formula. Finally, I examined the reliability and validity of the procedures of the study to ensure the outcomes of the study were valid scholarly research. In Section 3, the data I present (a) an overview of the study, (b) study findings, (c) application to professional practice, (d) implications for social change, (e) recommendations for action and future research, (f) reflections, (g) a summary, (h) and conclusions.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this quantitative correlational study was to determine whether a relationship existed between retail employees' technostress and employee productivity, and if so, whether technological self-efficacy mediated the relationship. In this study, I used data from 112 front-line retail staff employed in the retail supply-chain industry in Florida. Study findings revealed that participants reported low levels of technostress, technological self-efficacy, and work productivity. The statistical analyses conducted for hypothesis testing were Pearson bivariate correlations and multiple linear regression. Statistical findings indicated that technostress was not significantly associated with employee productivity. However, technostress was significantly associated with technological self-efficacy; as employees' technostress levels increased, so did their levels of technological self-efficacy. The result was unexpected because technostress is a form of stress typically found among individuals who are unable to cope with the requirements of technology use. While technological self-efficacy was significantly related to employee productivity, self-efficacy did not significantly mediate the relationship between technostress and employee productivity.

Presentation of the Findings

The data set included survey responses from 112 retail employees of supply chains in Florida. The participants provided informed consent before they completed the questionnaires. I first reviewed the data to confirm that study participants provided informed consent and identified themselves as age 18 or older. I collected data using

Qualtrics study recruitment services to guarantee 100% compliance from 112 participants. According to Qualtrics's survey panel requirements, all potential study participants must provide informed consent. Qualtrics administrators maintain a list of potential study participants and send out e-mails to these individuals if they meet study criteria. Participants who answer an online survey receive compensation in the form of reward points, which have an estimated value of $1.50 for each survey completed. Participants can redeem points for gift cards. Administrators at Qualtrics are solely responsible for recruitment and incentives, which allows the participants to remain anonymous to the researcher. I reviewed the data for any missing values and found that all cases had complete data.

The first analysis was descriptive in nature and pertained to the study participants. Descriptive statistics (i.e., frequencies and percentages) indicated that 100% of participants worked in the retail industry in the state of Florida and used technology in their retail roles (Table 1). The variable, length of time employed in the retail industry, was ordinal-coded and ranged from *less than 1 year* to *more than 4 years*. However, as indicated in Table 1, participants gave only two types of responses. Namely, 20 (17.9%) of the participants reported they had worked in the retail industry for 3 to 4 years, and 92 (82.1%) reported having worked in the industry for more than 4 years.

Table 1

Frequencies and Percentages: Work Information (N = 112)

Variable	Frequency *N*	Percentage %
Work in the retail industry		
Yes	112	100.0
No	0	0.0
Use technology in retail position		
Yes	112	100.0
No	0	0.0
Length of time working in retail industry		
3-4 years	20	17.9
More than 4 years	92	82.1

Descriptive Statistics: Study Variables

I measured three variables in this study. The independent variable was employee technostress, assessed using the 5-item Information Technology Works instrument (ITW; Torkzadeh & Doll, 1999). A high score on the ITW indicates high levels of technostress (Torkzadeh & Doll, 1999). The mediator variable was adaptation of technological self-efficacy, measured using the 10-item Survey Scale for Generalized Self-Efficacy (SSGS; Schwarzer & Jerusalem, 1995). A high score on the SSGS denotes high levels of technological self-efficacy (Schwarzer & Jerusalem, 1995). Finally, the dependent variable was employee productivity, and I measured this construct using the four-item Survey Scale for Employee Productivity (SSEP; Tarafdar & Roy, 2003). A high score on the SSEP indicates high employee productivity levels (Tarafdar & Roy, 2003). Analysis of these variables allowed me to determine whether a relationship existed between

employee technostress and employee productivity, and if so, how technological self-efficacy mediated that relationship.

I computed descriptive statistics (i.e., mean, median, standard deviation, and minimum and maximum scores) for the three study variables (Table 2). ITW scores can range from 5 to 30 points. Higher scores on the ITW indicated higher levels of technostress (Torkzadeh & Doll, 1999). In this study, the Cronbach's alpha of the ITW was .85, confirming very good inter-item reliability. The ITW technostress mean score was 11.88 (*Md* = 11, *SD* = 4.04). The ITW scores ranged from 5 to 23 points (Figure 2). The mean ITW score of 11.88 and median ITW score of 11 indicated that participants had relatively low levels of technostress, although the scale scores ranged from 5, a very low level of technostress, to 23, a very high level of technostress.

Table 2

Descriptive Statistics: Study Variables (N = 112)

Variable	*M*	*Md*	*SD*	Min	Max	Cronbach's alpha
ITW technostress[a]	11.88	11.00	4.04	5	23	.85
SSGS technological self-efficacy[b]	20.48	20	6.45	10	38	.86
SSEP employee productivity[c]	8.32	8	2.56	4	15	.89

Note. [a] The ITW technostress scale can range from 5 to 30 points, with higher scores denoting higher levels of technostress. [b] The SSGS technological self-efficacy scale can range from 10 to 60 points, with higher scores indicating higher levels of technological self-efficacy. [c] The SSEP employee productivity scale can range from 4 to 24 points, with higher scores signifying higher levels of employee productivity.

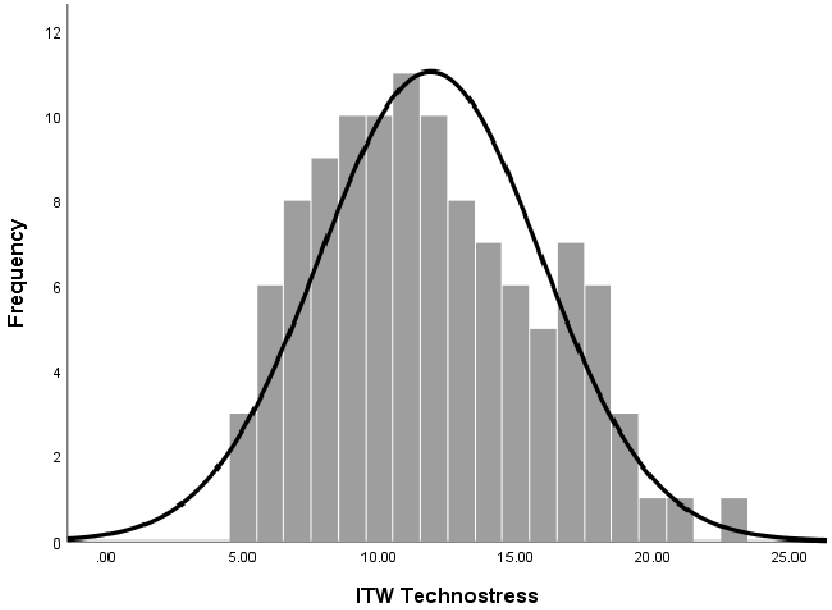

Figure 2. Histogram: Technostress scores.

Scores on the SSGS technological self-efficacy scale can range from 10 to 60 points, and higher scores on the SSGS signify higher levels of technological self-efficacy (Schwarzer & Jerusalem, 1995). In this study, the Cronbach's alpha was .86, confirming the reliability of the instrument. The SSGS technological self-efficacy mean score was 20.48 (*Md* = 20, *SD* = 6.45). The SSGS scores ranged from 10 to 38 points (Figure 2). The SSGS mean score of 20.48 and median score of 20 suggested that participants reported relatively low levels of technological self-efficacy. The range of scores also indicated participants had low levels of technological self-efficacy, as the highest SSGS score was 38 of a possible 60 points.

The scores on the SSEP range from 4 to 24 points, and higher scores on the SSEP signify higher levels of employee productivity (Tarafdar & Roy, 2003). In this study, the

Cronbach's alpha of the SSEP scale was .88, denoting excellent inter-item reliability. The SSEP employee productivity mean score was 8.32 (*Md* = 8, *SD* = 2.56), and scores on the SSEP ranged from 4 to 15 points (Figure 3). The SSEP mean score of 8.32, the median score of 8, and the truncated highest score of 15 (of a possible 24 points) denoted low levels of employee productivity among participants.

Figure 3. Histogram: Technological self-efficacy scores.

Figure 4. Histogram: Employee productivity scores.

Covariate Testing

One potential covariate, the number of years that the participants worked in the retail industry, emerged during this study. Responses were dichotomous; 20 participants (17.9%) stated they had worked in retail between 3 and 4 years, and 92 (82.1%) participants reported having worked in retail for more than 4 years. I conducted three-point biserial correlations to determine if the number of years employed in the retail industry was significantly associated with the study variables of technostress, technological self-efficacy, and employee productivity. A point biserial correlation, denoted as $r_{pb,}$ was appropriate to examine the relationship between a "true dichotomous variable" and "a continuous variable" (Dănăcică & Paliu-Popa, 2017, p. 154). The years employed in retail variable was a dichotomously coded variable, and the three study variables were all interval or continuously coded. The point biserial correlation results indicated the number of years employed in the retail industry was not significantly

associated with any of the study variables (Table 3). Therefore, I did not need to include that variable as a covariate in the series of linear regressions for hypothesis testing.

Table 3

Point Biserial Correlations: Numbers of Years in the Retail Industry and Technostress, Technological Self-Efficacy, and Employee Productivity (N = 112)

Variable	Number of years employed in the retail industry	
	r_{pb}	*P*
ITW technostress	.02	.832
SSGS technological self-efficacy	-.11	.248
SSEP employee productivity	-.08	.412

Testing of the Data Assumptions for Correlation/Linear Regression

Certain assumptions about the data must be met to ensure the statistical findings for linear regression hypothesis testing are valid. Correlational and linear regression statistics have four key assumptions (Ernst & Albers, 2017; Puth et al., 2014). The first is normality in the distribution of variable scores (Ernst & Albers, 2017; Korany et al., 2016). The second assumption is homoscedasticity, meaning the error (residual) values are similar for each predictor-criterion variable pair (Ernst & Albers, 2017; Puth et al., 2014). The third assumption is a linear relationship between the study variables (Dong et al., 2017; Ernst & Albers, 2017). The fourth and final assumption is a lack of multicollinearity between the independent and mediating variables (Field & Wilcox, 2017; X. Liu et al., 2016). The assumption of lack of multicollinearity indicates that the independent and mediating variables are so highly correlated that they essentially measure the same construct (Ernst & Albers, 2017; X. Liu et al., 2016). I conducted

specific statistical tests to determine whether the data violated any of these assumptions. The following sections provide the results from the testing of assumptions.

Assumption of normality. The first assumption test was for variable normality, the normal distribution of scale scores. A violation of normality is a concern, as it can affect the homoscedasticity assumption (Yang & Mathew, 2018). Moreover, any violations of assumptions of normality may result in a standard bias error and a Type I error, or findings that appear to be significant when they are not. This error may lead to an erroneous failure to accept the null hypothesis (Korany et al., 2016). I calculated $z_{skewness}$ values (i.e., divided the skewness value by the skewness standard error [SE]; Korany et al. 2016) to determine if the three study variables displayed normality. If a $z_{skewness}$ value of a variable is less than +/- 3, the variable has acceptable normality in the distribution of scale scores (Korany et al., 2016). All study variables had $z_{skewness}$ scores less than +/- 3 (Table 4); therefore, all variables met the assumption of normality.

Table 4

$Z_{skewness}$ Values: Study Variable Normality (N = 112)

Variable	$Z_{skewness}$
ITW technostress	1.66
SSGS technological self-efficacy	1.68
SSEP employee productivity	1.50

Assumption of homoscedasticity. Second, I tested the assumption of homoscedasticity, that error (residual) values are similar for each x and y relationship, for the relationships between (a) the independent and dependent variables, (b) the independent and mediator variables, and (c) the mediator and dependent variables.

Scatterplots of errors (residuals) display results for each relationship. The assumption of homoscedasticity is met if the residual scores are equally dispersed above and below the horizontal zero (Dong et al., 2017; Ernst & Albers, 2017).

The scatterplot for the technostress and work productivity relationship (Figure 5) indicated the errors (residuals) were equally dispersed above and below the horizontal zero (0). Therefore, the assumption of homoscedasticity was met for the technostress and work productivity relationship. The second scatterplot was for the relationship between technostress and technological self-efficacy (Figure 6); again, the errors (residuals) were equally distributed above and below the horizontal zero (0) and the assumption was met for the technostress and technological self-efficacy relationship. The third and final scatterplot was for the relationship between technological self-efficacy and work productivity (Figure 7), and the errors (residuals) were equally distributed above and below the horizontal zero (0). The assumption of homoscedasticity was met for the technological self-efficacy and work productivity relationship.

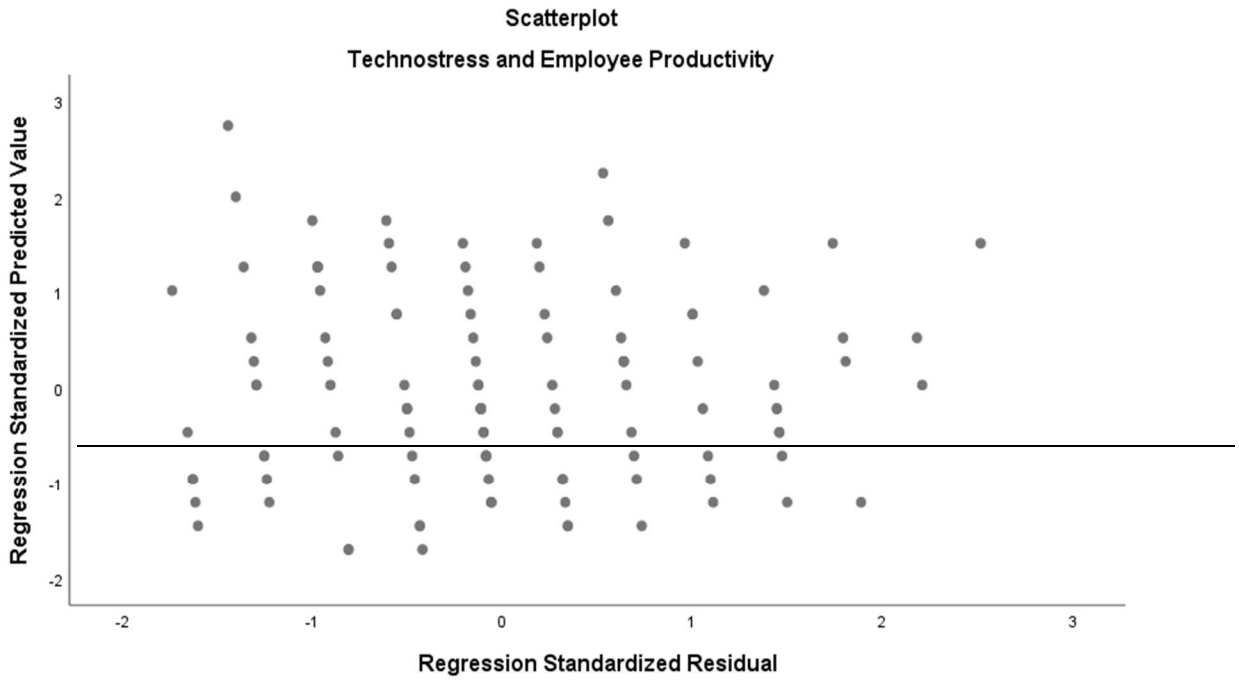

Figure 5. Scatterplot: Technostress and work productivity.

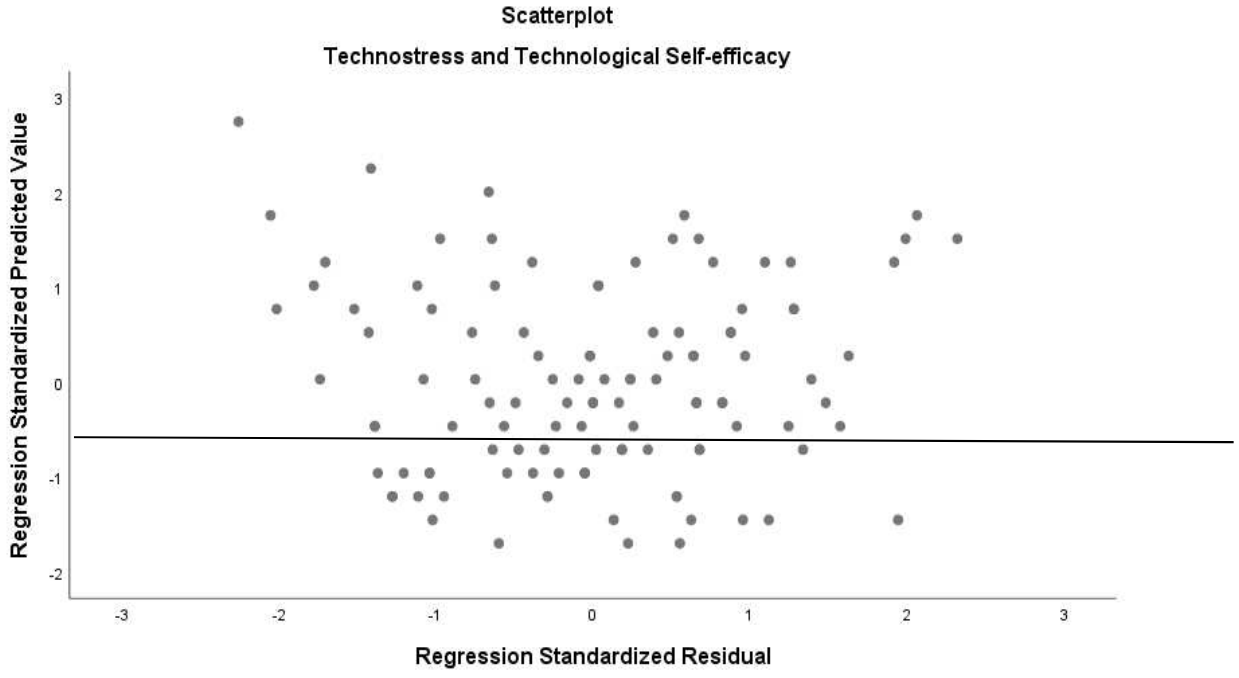

Figure 6. Scatterplot: Technostress and technological self-efficacy.

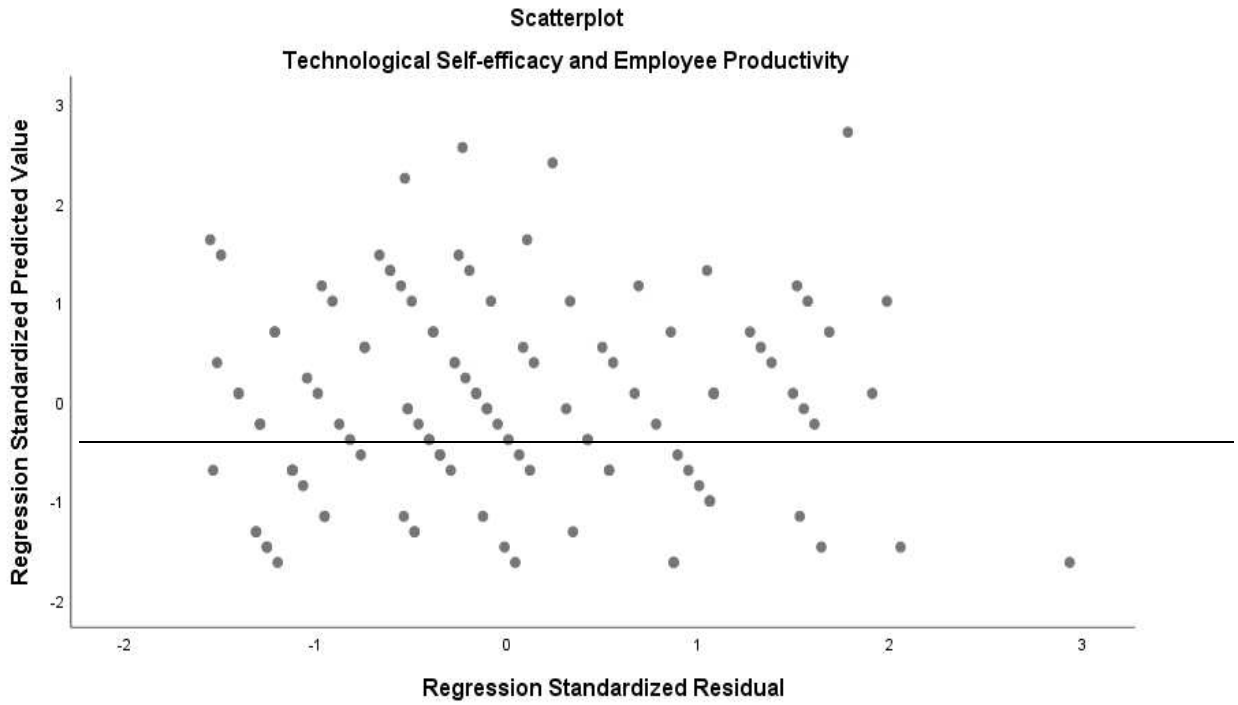

Figure 7. Scatterplot: Technological self-efficacy and work productivity.

Assumption of linearity. To test for the presence of linearity for all variable relationships, I computed partial probability (P-P) plots of errors (residuals) for each relationship. The assumption of linearity is met if the residual scores fall along the diagonal line of the P-P plot (Dong et al., 2017; Ernst & Albers, 2017). Results of these computations indicated that for all three relationships, the errors (residuals) aligned on the diagonal. Thus, the assumption of linearity was met for the technostress and work productivity relationship (Figure 8), the technostress and technological self-efficacy relationship (Figure 9), and the technological self-efficacy and work productivity relationship (Figure 10).

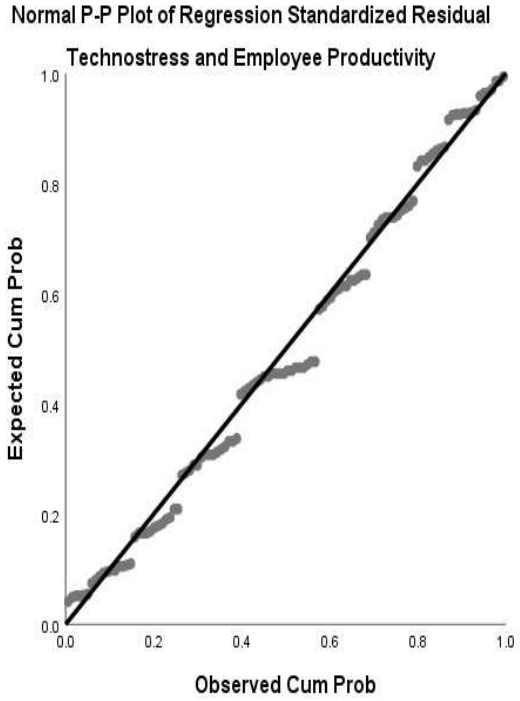

Figure 8. P-P plot: Technostress and work productivity.

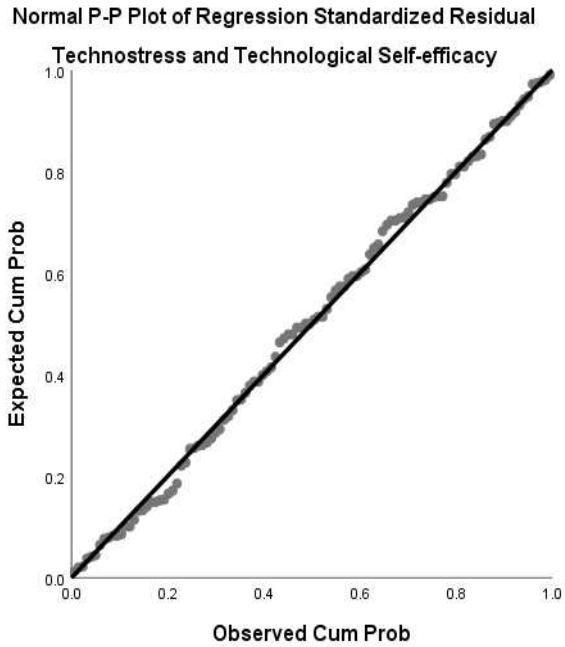

Figure 9. P-P plot: Technostress and technological self-efficacy.

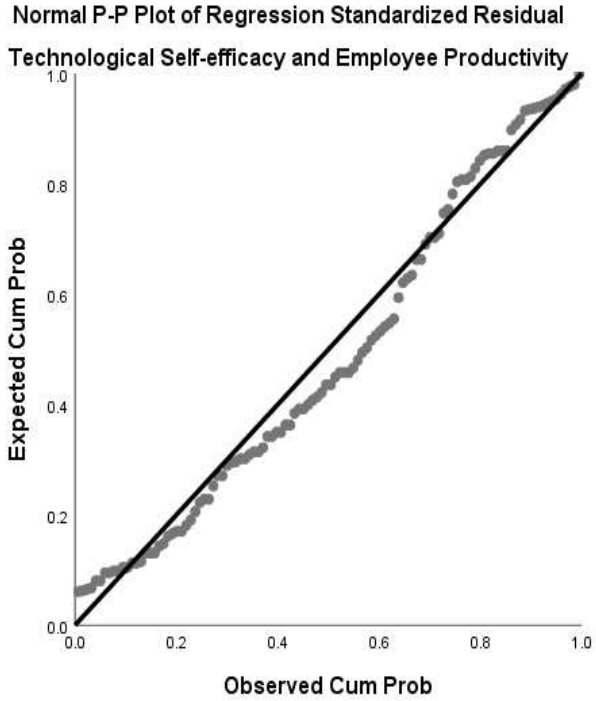

Figure 10. P-P plot: Technological self-efficacy and work productivity.

Assumption of lack of multicollinearity. The fourth assumption to be tested was lack of multicollinearity, which means that the variables are not so highly correlated that they are measuring the same construct; they are distinct and different variables. Computation of variance inflation factors (VIFs) is the way to test for multicollinearity. A VIF that is less than 10.00 denotes that multicollinearity is absent among variables (Field & Wilcox, 2017; X. Liu et al., 2016). All VIFs were less than 10.00; the technostress variable had a VIF of 1.15, technological self-efficacy variable had a VIF of 1.29, and the work productivity variable had a VIF of 1.14 (Table 5). Therefore, the assumption of lack of multicollinearity was met.

Table 5

Variance Inflation Factors (VIFs): Lack of Multicollinearity Among Study Variables (N = 112)

Variable	Variance inflation factor (VIF)
ITW technostress	1.15
SSGS technological self-efficacy	1.29
SSEP work productivity	1.14

Note. A VIF < 10 indicates lack of multicollinearity (Field & Wilcox, 2017; X. Liu et al., 2016).

Study Findings: Research Question

One primary research question guided this study: Is there a relationship between employee technostress and employee productivity, and if so, is this relationship mediated by technological self-efficacy? The null and associated hypotheses were

$H1_0$: Technological self-efficacy does not mediate the relationship between supply chain managers' technostress and employee productivity.

$H1_A$: Technological self-efficacy mediates the relationship between supply chain managers' technostress and employee productivity.

According to Baron and Kenny (1986), the predictor, mediating, and criterion variables all must be significantly correlated with one another to meet the first requirement of mediation. I conducted a series of Pearson bivariate correlations to determine if the three study variables were significantly associated with one another (Table 6). The predictor variable of technostress was significantly associated with technological self-efficacy, $r(112) = .35$, $p < .001$. As employees' technostress increased, so did their technological self-efficacy. Technostress, however, was not significantly associated with employee productivity, $r(112) = .06$, $p = .564$. Technological self-

efficacy was significantly associated with employee productivity, $r(112) = .34$, $p < .001$. As employees' technological self-efficacy increased, so did their productivity. The variables did not meet the first statistical requirement for mediation, as established by Baron and Kenny (1986). The lack of significance between technostress and employee productivity precluded the option of conducting multiple linear regression for mediation.

Table 6

Pearson Bivariate Correlations: Technostress, Technological Self-efficacy, and Employee Productivity

Variable	ITW technostress	SSGS technological self-efficacy	SSEP employee productivity
ITW technostress	--	.35***	.06
SSGS technological self-efficacy		--	.34***
SSEP employee productivity			--

Note. *** $p < .001$.

The second analysis was multiple linear regression with technostress and technological self-efficacy as predictors of employee productivity (Table 7). Results indicated the overall linear regression model was significant, $F(2, 109) = 44.34$, $p = .001$. The R^2 was .12, a small effect size. Bivariate findings indicated that technostress was not significantly associated with employee productivity, $\beta(112) = -.07$, $p = .442$. Technological self-efficacy was significantly associated with employee productivity, $\beta(112) = .37$, $p = .001$. As employees' technological self-efficacy increased, so did their productivity.

Table 7

Technostress and Technological Self-Efficacy Predicting Employee Productivity

Variable		*B*	*SE B*	B
ITW technostress		-.05	.06	-.07
SSGS technological self-efficacy		.15	.04	.37***
Model *F*	44.34			
Model R^2	.12			
P	.001			

Note. *** $p < .001$

The null and associated hypotheses for this study were:

$H1_0$: Technological self-efficacy does not mediate the relationship between supply chain managers' technostress and employee productivity.

$H1_A$: Technological self-efficacy mediates the relationship between supply chain managers' technostress and employee productivity.

The results of the Pearson bivariate correlations and linear regression indicated technological self-efficacy did not mediate the relationship between supply chain managers' technostress and employee productivity. However, for every .37 increase in technological self-efficacy, productivity increased 1.00. Nevertheless, the lack of significance required the retention of the null hypothesis ($H1_0$) in this study.

Applications to Professional Practice

Results from this study may inform the professional practice of business. One finding was that participants reported low levels of technostress. Another result was that as employees' technostress increased, so did their technological self-efficacy but not their levels of productivity. These counter-intuitive findings were intriguing. Previous outcomes indicated that employee technostress is significantly linked to employee

competence and the usability of IT systems (Brod, 1984; R. Hassan, 2014; Issa & Isaias, 2014) and to task difficulty (Tarafdar et al., 2015). The lack of challenging work may have prevented the employees in this study from actively engaging in their work, and this low engagement may have been reflected in their low levels of work productivity. The employees in this study may work with IT systems that are very user-friendly, perhaps to the point that the systems are too simplistic and not challenging enough. Retail staff's work tasks may be too streamlined and simplistic, resulting in boredom and lack of engagement in work. The retail positions in which the participants worked may not have offered enough technological complexity to hold employees' attention and interest in their work.

The results of this study also indicated that as employees' technological self-efficacy increased, so did their productivity. Despite the low levels of both technological self-efficacy and employee productivity among study participants, the relationship between self-efficacy and productivity was significant. Previous empirical literature indicated that front-line retail employees have poor digital problem-solving skills and exhibit low levels of technological self-efficacy (Tarafdar et al., 2015; Tarafdar et al., 2010). Therefore, retail employers may benefit from implementation of newer IT systems intended to improve organizational profits (Chesley, 2014). Employers may be concerned about the costs of new IT systems and the resultant training required for staff. However, employers must consider these costs in relation to the losses than may result from low employee productivity. Low employee productivity erodes organizational profits (Tarafdar et al., 2015; Tarafdar et al., 2014b). If employers help to enhance retail staff's

technological self-efficacy, employees' productivity may increase, resulting in higher organizational profits.

Implications for Social Change

By applying the results of this study, I offered insight and extended the knowledge of technostress complexity for retail supply chain managers, who may apply the information to benefit their employees. Application of this knowledge may help retail supply chain managers recognize and mitigate technostress subcomponent techno-complexity and improve health and work conditions for employees. Retail supply chain managers' ability to recognize technostress may promote social change by increasing technological self-efficacy, decreasing technostress, reducing stress, increasing low productivity, and improving work-life balance.

Organizations that show indications of technology complexity can reduce technostress conditions by improving the workplace climate (Tarafdar et al., 2014a). Retail supply chain managers' ability to recognize technostress can promote social change by increasing awareness and understanding of strategies for reducing employee absenteeism and burnout. The information in this study may further help retail supply chain managers improve employee well-being, enhance working conditions, and increase productivity for higher organizational profitability and a prosperous community.

Recommendations for Action

Participants in the study identified coping strategies that retail supply chain managers could use to reduce technostress among their employees. Current and future retail supply chain managers should implement these findings as a business benefit.

Study findings indicated that as employees' technostress increased, so did their technological self-efficacy. The responses to the survey revealed strategies for reducing technostress such as implementing internal technical expertise, mentorships, two-way employee communication, technological training courses, and wellness programs to reduce the stress of complex technology.

Another recommendation is that administrators and managers synchronize their internal technological cultures with the input of technological experts to reduce technostress. Business leaders should provide retail supply chain managers with training programs to teach them to recognize technostress, implement a plan to measure the stress, and communicate ways to mitigate technostress in an overall collaboration to promote technological management knowledge. In addition, organizational leaders should train retail supply chain managers to understand individual differences associated with technological proficiency and to accommodate technological shifts in work duties to reduce technostress. Finally, business leaders should implement a wellness plan that includes discounts towards gym membership, massage therapy, health insurance, and monthly fitness challenges to help employees reduce their stress at work. Wellness programs can help minimize technostress, health ailments, and reduce health care costs (Tarafdar et al., 2014a).

Further, retail business organizations in Florida should focus on these results and collaborate with future retail supply chain managers at quarterly conferences and workshops. I will inform interested stakeholders that the full research study is available to those who wish to read it. My final recommendation is that retail supply chain managers

in the Florida area share the study results with other retail supply chain managers across the United States and provide useful knowledge and viable strategies for technostress reductions and employee productivity improvement.

Recommendations for Further Research

Researchers may find guidance for future studies aimed at improving business practice in the results of this study. Few scholars have examined whether employees' technological self-efficacy mediates the relationship between technostress and employee productivity. Findings may differ for scholars who use different populations of participants and larger samples, although such mediation was not evident in this study. This study was specific to front-line retail staff in Florida, and use of a geographically isolated sample limited the generalizability of findings. Nevertheless, the results of this study implied the need for future empirical work to examine the relationships among technostress, technological self-efficacy, and productivity in samples of retail employees, including those who hold organizational leadership roles and those in various geographical locations. Such studies may lead to changes in business practices that result in improvements in staff outcomes and productivity as well as organizational profit. Longitudinal studies of employees' technostress, self-efficacy, and productivity over time (e.g., quarterly, yearly) and those variables' relationships to organizational profits may enhance business practice, as well.

This study was nonexperimental, and as such, the results do not support conclusions regarding causality. Experimental designs (e.g., in which the level of technostress and self-efficacy is manipulated) or quasi-experimental designs (e.g., in

which employees are assigned to high- versus low-technostress and/or self-efficacy groups based on survey scores) would enhance the business literature. The potential for confounding bias was inherent in the correlational design of this study. Factors other than those measured in this study (e.g., age, gender, education level, level of training, type of position) may have influenced employees' technological self-efficacy and productivity and masked a significant relationship between technostress and employee productivity. Therefore, the need remains to comprehensively examine employee demographics, skill levels, and work factors that significantly covary with the study's variables. Future researchers who examine different mediators or moderators may enhance understanding of employee technological skill and productivity.

Reflections

As someone with a deep interest in why and how things occur, I began this study with the preconceived idea that a relationship existed between the stresses of technology and employees' productivity levels. During the study's progression, my ability to conduct quantitative research improved, and my knowledge of SPSS programming increased. Overall, my greatest challenge was understanding Qualtrics software. Gaining access to participants through Qualtrics software was fast and straightforward, and the software included built-in protections for the privacy and confidentiality of the recruits and their organizations.

The data collection for this in-depth research on technostress was limited to questionnaires and included no open-ended responses. I had to interpret and generalize the participants' meanings based solely on their responses of *strongly agree* or *strongly*

disagree. I relied on previous literature to help analyze each respondent's submission. I also learned the value of utilizing a statistician for the SPSS program.

I learned about technological self-efficacy theory and how to apply the theory to current research efforts. The findings indicated that applying coping strategies to ease the stresses of technology may reduce technostress and improve productivity. These findings aligned with the technological self-efficacy theory and the holistic approach to promoting employee productivity. I applied the technological self-efficacy theory to examine the phenomenon of technostress and consider the same factors that retail supply chain managers face with their employees.

The technological self-efficacy theory in this study illuminated social, cultural, and technical areas. Retail supply chain managers consider these areas to gain an understanding of technostress and to implement strategies to cope with stressors of technology and completing tasks. Discussions of coping strategies with retail supply chain managers helped me to understand how to minimize technostress and increase the productivity of employees. I gained an increased understanding of collaboration building for knowledge sharing and training as a way to reduce technostress. I learned more about how employees without coping strategy programs seek other, less stressful environments in which to earn a living. Once the employees became familiar with the new technology and mastered its use, the reduced stress of the end-user and training helped minimize their fears of new technology and goal completion.

Conclusion

The purpose of this quantitative correlational study was to determine whether a relationship existed between retail employees' technostress and employee productivity, and if so, whether technological self-efficacy mediated the relationship. A series of Pearson bivariate correlations and linear regressions determined whether the three study variables were significantly associated with one another. Statistical analysis revealed the predictor variable of technostress was significantly associated with technological self-efficacy. As employees' technostress increased, so did their technological self-efficacy.

Technostress was not significantly associated with employee productivity. Technological self-efficacy was significantly associated with employee productivity. As employees' technological self-efficacy increased, so did their productivity. The results of the Pearson bivariate correlations and linear regression indicated that technological self-efficacy did not mediate the relationship between supply chain managers' technostress and employee productivity. As such, the null hypothesis (Technological self-efficacy does not mediate the relationship between supply chain managers' technostress and employee productivity) was retained in this study.

The results of this study supported the conclusion that business professionals may benefit from implementing newer IT systems to improve profits and create mentorships to train employees. Business leaders should explore implementing measures that promote positive social changes, such as mentorship, communication, employee engagement, and employee well-being. Increased self-efficacy and decreased technostress may improve

the health and well-being of individuals who face technostress at work and thus reduce health costs to employees.

References

Abad, J. R. D., Golshani, F., Imamipour, S., & Hassani, F. (2016). The relationship between personality traits and intrinsic motivation and self-efficacy of faculty members of ACECR. *Iranian Journal of Social Science and Humanities Research, 4*(2), 69-75. Retrieved from http://www.uctjournals .com/index. php/journal-home-ujsshr

Accenture. (2017). *Technology vision 2017 for retail: Power to the people: Mass-personalization is the new retail imperative*. Retrieved from https://www. accenture.com/us-en

Adil, M. S. (2014). Impact of leader's change-promoting behavior on readiness for change: A mediating role of organizational culture. *Journal of Management Sciences*, *1*(2), 113-150. doi:10.20547/jms.2014.1401202

Alam, M. A. (2016). Technostress and productivity: Survey evidence from the aviation industry. *Journal of Air Transport Management*, *50*, 62-70. doi:10.1016/j. jairtraman.2015.10.003

Anthoine, E., Moret, L., Regnault, A., Sébille, V., & Hardouin, J. B. (2014). Sample size used to validate a scale: A review of publications on newly developed patient reported outcomes measures. *Health and Quality of Life Outcomes*, *12*(1), 1-10. doi:10.1186/s12955-014-0176-2

Aristidis, V. (2015). The promotion of smoking habit through music: Pilot study. *Health Science Journal*, *9*(3), 1-4. Retrieved from http://www.hsj.gr/

Aspen Institute. (2017, November 17). *What's in store: The future of work in retail*. Retrieved from https://assets.aspeninstitute.org

Asamoah, M. K. (2014). Re-examination of the limitations associated with correlational research. *Journal of Educational Research and Reviews*, *2*(4), 45-52. Retrieved from http://www.sciencewebpublishing.net

Atanasoff, L., & Venable, M. A. (2017). Technostress: Implications for adults in the workforce. *Career Development Quarterly*, *65*(4), 326–338. doi:10.1002/cdq.12111

Babbie, E. R. (2015). *The practice of social research*. New York, NY: Nelson Education.

Bakar, A., Ali, A., & Zaki, W. (2016). Employee training as a predictor of self-efficacy in financial institutions of Pakistan: A note. *Paradigms*, *10*(2), 94-103. doi:10.24312/paradigms100209

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191-215. doi:10.1037//0033-295x.84.2.191

Bandura, A. (1978). Social learning theory of aggression. *Journal of Communication*, *28*(3), 12-29. doi:10.1111/j.1460-2466.1978.tb01621.x

Bandura, A. (2011). A social cognitive perspective on positive psychology. *Revista de Psicología Social*, *26*(1), 7-20. doi:10.1174/021347411794078444

Bandura, A., & Wessels, S. (1997). *Self-efficacy*. London, England: W. H. Freeman.

Bandura, A., & Whalen, C. K. (1966). The influence of antecedent reinforcement and divergent modeling cues on patterns of self-reward. *Journal of Personality and Social Psychology*, *3*(4), 373-382. doi:10.1037/h0023022

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1,173-1,182. doi:10.1037/ 0022-3514.51.6.1173

Barry, A. E., Chaney, B., Piazza-Gardner, A. K., & Chavarria, E. A. (2014). Validity and reliability reporting practices in the field of health education and behavior: A review of seven journals. *Health Education & Behavior*, *41*(1), 12-18. doi:10. 1177/1090198113483139

Bata, H., Pentina, I., Tarafdar, M., & Pullins, E. B. (2018). Mobile social networking and salesperson maladaptive dependence behaviors. *Computers in Human Behavior*, *81*, 235-249. doi:10.1016/j.chb.2017 .12.025

Bejami, M., Gharavian, D., & Charkari, N. (2014). Audiovisual emotion recognition using ANOVA feature selection method and multi-classifier neural networks. *Neural Computing and Applications*, *24*(2), 399-412. doi:10.1007/s00521-012-1228-3

Benchoufi, M., Porcher, R., & Ravaud, P. (2018). Blockchain protocols in clinical trials: Transparency and traceability of consent [version 2; peer review: 1 approved, 1 not approved]. *F1000Research*, *6*(66). doi:10.12688/ f1000research.10531.2

Bergson-Shilcock, A. (2017, February). *Foundational skills in the service sector: Understanding and addressing the impact of limited math, reading, and technology proficiency on workers and employers*. Retrieved from https://www. nationalskillscoalition.org

Bikas, H., Stavropoulos, P., & Chryssolouris, G. (2016). Additive manufacturing methods and modelling approaches: A critical review. *The International Journal of Advanced Manufacturing Technology*, *83*(1-4), 389-405. doi:10.1007/s00170-015-7576-2

Bhatnagar, J. (2014). Mediator analysis in the management of innovation in Indian knowledge workers: The role of perceived supervisor support, psychological contract, reward and recognition and turnover intention. *International Journal of Human Resource Management*, *25*(10), 1,395-1,416. doi:10.1080/09585192.2013.870312

Bhattacharjee, A., Chatterjee, P., Shaw, M. P., & Chakraborty, M. (2014). ETL based cleaning on database. *International Journal of Computer Applications*, *105*(8), 34-40. Retrieved from https://www.ijcaonline.org/

Blau, G. (1989). Testing the generalizability of a career commitment measure and its impact on employee turnover. In G. Atinc (Ed.), *Academy of management proceedings* (Vol. 1989; pp. 53-57). Briarcliff Manor, NY: Academy of Management.

Blitz, A. (2016). Beset by the digital revolution successful retailers embrace technology that enhances customer value. *Strategy & Leadership*, *44*(6), 16-24. doi:10.1108/SL-09-2016-0073

Bonett, D., & Wright, T. (2014). Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning. *Journal of Organizational Behavior*, *36*, 3-15. doi:10.1002/job.1960

Brannen, J. (2017). Combining qualitative and quantitative approaches: an overview. In *Mixing methods: Qualitative and quantitative research* (pp. 3-37). New York, NY: Routledge.

Breevaart, K., Bakker, A. B., & Demerouti, E. (2014). Daily self-management and employee work engagement. *Journal of Vocational Behavior*, *84*(1), 31-38. doi: 10.1016/j.jvb.2013.11.002

Brod, C. (1982). Managing technostress: Optimizing the use of computer technology. *Personnel Journal, 61*(10), 753-757. Retrieved from Premier Search Database. (Accession No. 203640406)

Brod, C. (1984). *Technostress: The human cost of the computer revolution*. Boston, MA: Addison Wesley.

Buonocore, F., Russo, M., & Ferrara, M. (2015). Work–family conflict and job insecurity: Are workers from different generations experiencing true differences? *Community, Work & Family*, *18*(3), 299-316. doi:10.1080/ 13668803.2014 .981504

Callao, M. P. (2014). Multivariate experimental design in environmental analysis. *Trends in Analytical Chemistry*, *62*, 86-92. doi:10.1016/j.trac.2014.07 .009

Cardamone, A. S., Eboli, L., & Mazzulla, G. (2014). Drivers' road accident risk perception: A comparison between face-to-face interview and web-based survey. *Advances in Transportation Studies*, *2014*(33), 59-72. doi:10.4399/97888548728 995

Casimir, G., Ng, Y., Wang, K., & Ooi, G. (2014). The relationships amongst leader-member exchange, perceived organizational support, affective commitment, and in-role performance. *Leadership & Organization Development Journal, 35,* 366-385. doi:10.1108/LODJ-04-2012-0054

Catania, J., Dolcini, M., Orellana, R., & Narayanan, V. (2015). Nonprobability and probability-based sampling strategies in sexual science. *The Journal of Sex Research*, *52*(4), 396-411. doi:10.1080/00224499.2015.1016476

Chatman, J. A., Caldwell, D. F., O'Reilly, C. A., & Doerr, B. (2014). Parsing organizational culture: How the norm for adaptability influences the between culture consensus and financial performance in high□technology firms. *Journal of Organizational Behavior*, *35*(6), 785-808. doi:10.1002/job.1928

Chen, T., Li, F., & Leung, K. (2016). When does supervisor support encourage innovative behavior? Opposite moderating effects of general self□efficacy and internal locus of control. *Personnel Psychology*, *69*, 123-158. doi:10.111/peps.12104

Cherian, J., & Jacob, J. (2013). Impact of self-efficacy on motivation and performance of employees. *International Journal of Business and Management*, *8*, 80-88. doi: 10.5539/ijbm.v8n14p80

Chesley, N. (2014). Information and communication technology use, work intensification and employee strain and distress. *Work, Employment & Society, 28*(4), 589-610. doi:10.1177/0950017013500112

Cho, E., & Kim, S. (2015). Cronbach's coefficient alpha well known but poorly understood. *Organizational Research Methods, 18,* 207-230. doi:10. 1177/109442 8114555994

Christensen, A. I., Ekholm, O., Glümer, C., & Juel, K. (2014). Effect of survey mode on response patterns: Comparison of face-to-face and self-administered modes in health surveys. *European Journal of Public Health*, *24*(2), 327-332. doi:10.1093/ eurpub/ckt067

Clow, K., & James, K. (2014). Measurement methods. In *Essentials of marketing research: Putting research into practice* (pp. 253-283). Los Angeles, CA: Sage.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155-159. doi:10.1037/ 0033-2909.112.1.155

Connell, J., Gough, R., McDonnell, A., & Burgess, J. (2014). Technology, work organisation and job quality in the service sector: An introduction. *Labor & Industry: A Journal of the Social and Economic Relations of Work, 24*(1), 1-8. doi:10.1080/10301763.2013.877117

Corominas, A., Mateo, M., Ribas, I., & Rubio, S. (2015). Methodological elements of supply chain design. *International Journal of Production Research*, *53*(16), 5,017-5,030. doi:10.1080/00207543.2015.1013641

Cui, L., Wang, L., & Deng, J. (2014). RFID technology investment evaluation model for the stochastic joint replenishment and delivery problem. *Expert Systems with Applications*, *41*(4), 1,792-1,805. doi:10.1016/j.eswa. 2013.08.078

Cumberland, D. M., Meek, W. R., & Germain, R. (2015). Entrepreneurial self-efficacy and firm performance in challenging environments: Evidence from the franchise context. *Journal of Developmental Entrepreneurship*, *20*(1). doi:10.1142/S10849 46715500041

Cunningham, C. T., Quan, H., Hemmelgarn, B., Noseworthy, T., Beck, C. A., Dixon, E., . . . Jetté, N. (2015). Exploring physician specialist response rates to web-based surveys. *BMC Medical Research Methodology*, *15*(1). doi:10.1186 /s12874-015-0016-z

Curcuruto, M., Mearns, K. J., & Mariani, M. G. (2016). Proactive role-orientation toward workplace safety: Psychological dimensions, nomological network and external validity. *Safety Science*, *87*, 144-155. doi:10.1016/j.ssci. 2016.03.007

Curtis, E. A., Comiskey, C., & Dempsey, O. (2016). Importance and use of correlational research. *Nurse Researcher*, *23*(6), 20-25. doi:10.7748 /nr.2016.e1382

Daigneault, P. M. (2014). Reassessing the concept of policy paradigm: Aligning ontology and methodology in policy studies. *Journal of European Public Policy*, *21*(3), 453-469. doi:10.1080/13501763.2013.834071

Dănăcică, D.-E., & Paliu-Popa, L. (2017). Determinants of unemployment spells and exit destinations in Romania in a competing-risks approach. *Economic Research-Ekonomska Istraživanja*, *30*(1), 964–984. doi:10. 1080/1331677x.2017.13148 25

D'Arcy, J., Gupta, A., Tarafdar, M., & Turel, O. (2014). Reflecting on the "dark side" of information technology use. *Communications of the Association for Information Systems*, *35*. Retrieved from http://aisel. aisnet.org/cais/

Deloitte. (2017). *Global powers of retailing: The art and science of customers*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/global/ Documents/ consumer-industrial-products/gx-cip-2017-global-powers-of-retailing.pdf

Domingues, J., Vieira, V. A., & Agnihotri, R. (2017). The interactive effects of goal orientation and leadership style on sales performance. *Marketing Letters*, *28*(4), 637-649. doi:10.1007/s11002-017-9436-3

Dong, Y., Lin, H., & He, Y. (2017). Correlation between physicochemical properties of modified clinoptilolite and its performance in the removal of ammonia-nitrogen. *Environmental Monitoring and Assessment*, *189*(3), 1-10. doi:10.1007/s10661-017-5806-9

Dunn, T., Baguley, T., & Brunsden, V. (2014). From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *The British Journal of Psychology*, *105*(3), 399-412. doi:10.1111/bjop.12046

Dutwin, D., & Buskirk, T. D. (2017). Apples to oranges or gala versus golden delicious? Comparing data quality of nonprobability internet samples to low response rate probability samples. *Public Opinion Quarterly*, *81*(S1), 213-239. doi.org/10.1093/ poq/nfw061

Egbewale, B. E., Lewis, M., & Sim, J. (2014). Bias, precision and statistical power of analysis of covariance in the analysis of randomized trials with baseline imbalance: A simulation study. *BMC Medical Research Methodology, 14*(1), 1-21. doi:10.1186/1471-2288-14-49

Erens, B., Burkill, S., Couper, M. P., Conrad, F., Clifton, S., Tanton, C., . . . Copas, A. J. (2014). Nonprobability web surveys to measure sexual behaviors and attitudes in the general population: A comparison with a probability sample interview survey. *Journal of Medical Internet Research*, *16*(12). doi:10.2196/jmir.3382

Ernst, A. F., & Albers, C. J. (2017). Regression assumptions in clinical psychology research practice: A systematic review of common misconceptions. *PeerJ-Life & Environment*, *5*, e3323-e3331. doi:10.7717/peerj.3323

Farahani, R. Z., Rezapour, S., Drezner, T., & Fallah, S. (2014). Competitive supply chain network design: An overview of classifications, models, solution techniques and applications. *Omega*, *45*, 92-118. doi:10.1016/ j.omega.2013.08.006

Field, A. (2017). *Discovering statistics using IBM SPSS statistics: North American Edition.* Thousand Oaks, CA: Sage.

Field, A. P., & Wilcox, R. R. (2017). Robust statistical methods: A primer for clinical psychology and experimental psychopathology researchers. *Behaviour Research and Therapy*, *98*, 19-38. doi:10.1016/j.brat.2017.05.013

Fink, A. (2015). *How to conduct surveys: A step-by-step guide* (4th ed.). Los Angeles, CA: Sage.

Fitzgerald, S. P., Bean, N. G., & Ruberu, R. P. (2017). A method of decision analysis quantifying the effects of age and comorbidities on the probability of deriving significant benefit from medical treatments. *Journal of Comorbidity*, *7*(1), 50-63. doi:10.15256/joc.2017.7.93

Fitzmaurice, G., Lipsitz, S., Natarajan, S., Gawande, A., Sinha, D., Greenberg, C., & Giovannucci, E. (2014). Simple methods of determining confidence intervals for functions of estimates in published results. *PLoS ONE, 9*(5), 1-4. doi:10.1371/journal.pone.0098498

Forsythe, P., & Ahmadian Fard Fini, A. (2018, November). *Trialling the value of RFID technology in prefabricated timber construction* [Forest & Wood Products Australia Project No. PNA381-1516]. Retrieved from http://hdl. handle.net/10453/130100

Frayne, C. A., & Geringer, J. M. (2000). Self-management training for improving job performance: A field experiment involving salespeople. *Journal of Applied Psychology*, *85*(3), 361-372. doi:10.1037/0021-9010.85.3.361

Fugard, A. J., & Potts, H. W. (2015). Supporting thinking on sample sizes for thematic analyses: a quantitative tool. *International Journal of Social Research Methodology*, *18*(6), 669-684. doi:10.1080/13645579.2015.1005453

Fuglseth, A. M., & Sørebø, Ø. (2014). The effects of technostress within the context of employee use of ICT. *Computers in Human Behavior*, *40*, 161-170. doi:10.1016/j.chb.2014.07.040

Fulgoni, G. (2014). Uses and misuses of online-survey panels in digital research. *Journal of Advertising Research*, *54*(2), 133-137. doi:10.2501/JAR-54-2-133-137

Gist, M. E. (1987). Self-efficacy: Implications for organizational behavior and human resource management. *Academy of Management Review*, *12*(3), 472-485. doi:10.5465/amr.1987.4306562

Gist, M. E., & Mitchell, T. R. (1992). Self-efficacy: A theoretical analysis of its determinants and malleability. *Academy of Management Review*, *17*(2), 183-211. doi:10.5465/amr.1992.4279530

Glickman, M. E., Rao, S. R., & Schultz, M. R. (2014). False discovery rate control is a recommended alternative to Bonferroni-type adjustments in health studies. *Journal of Clinical Epidemiology*, *67*(8), 850-857. doi:10.1016/ j.jclinepi.2014. 03.012

Greenland, S., Senn, S. J., Rothman, K. J., Carlin, J. B., Poole, C., Goodman, S. N., & Altman, D. G. (2016). Statistical tests, *P* values, confidence intervals, and power: A guide to misinterpretations. *European Journal of Epidemiology*, *31*(4), 337-350. doi:10.1007/s10654-016-0149-3

Grewal, D., Roggeveen, A. L., & Nordfält, J. (2017). The future of retailing. *Journal of Retailing*, *93*(1), 1-6. doi:10.1016/j.jretai.2016.12.008

Haddad, S. I., & Taleb, R. A. (2016). The impact of self-efficacy on performance (An empirical study on business faculty members in Jordanian universities). *Computers in Human Behavior*, *55*, 877-887. Retrieved from https://www .journals.elsevier.com/computers-in-human-behavior/

Hammersley, M., & Traianou, A. (2014). Foucault and research ethics: On the autonomy of the researcher. *Qualitative Inquiry*, *20*(3), 227-238. doi:10. 1177/1077800 413489528

Harp, E. R., Scherer, L. L., & Allen, J. A. (2016). Volunteer engagement and retention. *Nonprofit and Voluntary Sector Quarterly*, *46*(2), 442–458. doi:10.1177/08997 64016651335

Harrison, A. W., & Rainer, R. K., Jr. (1992). The influence of individual differences on skill in end-user computing. *Journal of Management Information Systems*, *9*(1), 93–111. doi:10.1080/07421222.1992.11517949

Harriss, D., & Atkinson, G. (2015). Ethical standards in sport and exercise science research: 2016 update. *International Journal of Sports Medicine, 36*(14), 121-124. doi:10.1055/s00351565186

Hassan, R. (2014). Factors influencing turnover intention among technical employees in information technology organization: A case of XYZ (M) SDN. BHD. *International Journal of Arts and Commerce, 3*(9), 120-137. Retrieved from http://www.ijac.org.uk

Hassan, S. Y., Bashir, M., Abrar, M., Baig, S. A., & Zubair, A. (2015). The impact of transformational leadership on employees' creative self-efficacy: The moderating role of cognitive diversity. *International Journal of Information, Business and Management, 7*(3), 251-262. Retrieved from https://ijibm.elitehall.com /index.htm

Hauser, P. M. (1963). Schlesinger on humanism and empirical research. *American Sociological Review, 28*(1), 97-100. Retrieved from http://www.asanet.org/ journals/asr/

Hays, R. D., Liu, H., & Kapteyn, A. (2015). Use of internet panels to conduct surveys. *Behavior Research Methods*, *47*(3), 685-690. doi.10.3758/s 13428-015-0617-9

Helms, C., Gardner, A., & McInnes, E. (2017). The use of advanced web□based survey design in Delphi research. *Journal of Advanced Nursing*, *73*(12), 3168-3177. doi:10.1111/jan.13381

Henderson, V. C., Demko, N., Hakala, A., MacKinnon, N., Federico, C. A., Fergusson, D., & Kimmelman, J. (2015). A meta-analysis of threats to valid clinical inference in preclinical research of Sunitinib. *Elife*, *4*, e08351. doi:10.7554/elife.08351

Henretty, J. R., Currier, J. M., Berman, J. S., & Levitt, H. M. (2014). The impact of counselor self-disclosure on clients: A meta-analytic review of experimental and quasi-experimental research. *Journal of Counseling Psychology***,** *61*(2), 191-207. doi:10.1037/a0036189

Hox, J. J., De Leeuw, E. D., & Zijlmans, E. A. (2015). Measurement equivalence in mixed mode surveys. *Frontiers in Psychology*, *6*. doi:10.3389/fpsyg.2015.00087

Hristov, L., & Reynolds, J. (2015). Perceptions and practices of innovation in retailing: Challenges of definition and measurement. *International Journal of Retail & Distribution Management*, *43*(2), 126-147. doi:10.1108/IJRDM-09-2012-0079

Hsia, J. W., Chang, C. C., & Tseng, A. H. (2014). Effects of individuals' locus of control and computer self-efficacy on their e-learning acceptance in high-tech companies. *Behaviour & Information Technology*, *33*(1), 51-64. doi:10.1080/0144929x.2012.702284

Huijg, J. M., Gebhardt, W. A., Crone, M. R., Dusseldorp, E., & Presseau, J. (2014). Discriminant content validity of a theoretical domains framework questionnaire for use in implementation research. *Implementation Science*, *9*(1), 1-28. doi:10.1186/1748-5908-9-11

Hung, W. H., Chen, K., & Lin, C. P. (2015). Does the proactive personality mitigate the adverse effects of technostress on productivity in the mobile environment? *Telematics and Informatics, 32*(1)*,* 143-157. doi:10.1016/j.tele.2014.06.002

Hunter, D. (2015). We could be heroes: Ethical issues with the pre-recruitment of research participants. *Journal of Medical Ethics*, *41*, 557-558. doi:10.1136/medethics-2014-102639

Iroegbu, M. N. (2015). Self-efficacy and work performance: A theoretical framework of Albert Bandura's model, review of findings, implications and directions for future research. *Psychology and Behavioral Sciences*, *4*, 170-173. doi:10.11648/j.pbs.20150404.15

Issa, T., & Isaias, P. (2014). Human computer interaction and usability in the new participative methodology for marketing websites. *Pacific Asia Journal of the Association for Information Systems*, *6*(3), 47-78. doi:10.17705/1pais. 06303

Jaiswal, N. K., & Dhar, R. L. (2015). Transformational leadership, innovation climate, creative self-efficacy and employee creativity: A multilevel study. *International Journal of Hospitality Management, 51*(1), 30-41. doi:10.1016/j.ijhm.2015.07.002

Jena, R. K. (2015). Technostress in ICT enabled collaborative learning environment: An empirical study among Indian academician. *Computers in Human Behavior*, *51*, 1,116-1,123. doi:10.1016/j.chb.2015.03.020

Jerusalem, M., & Mittag, W. (1995). Self-efficacy in stressful life transitions. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 177-201). New York, NY: Cambridge University Press. doi:10.1017/ cbo9780511527692.008

Johnson, D. R., & Creech, J. C. (1983). Ordinal measures in multiple indicator models: A simulation study of categorization error. *American Sociological Review*, *48*(3), 398-407. doi:10.2307/2095231

Johri, R., & Misra, R. K. (2014). Self-efficacy, work passion and wellbeing: A theoretical framework. *IUP Journal of Soft Skills*, *8*(4), 20-35. Retrieved from https://www.iupindia.in/307/ijss.asp

Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert scale: Explored and explained. *British Journal of Applied Science & Technology*, *7*(4), 396-403. doi:10.9734/BLAST/2015/14975

Karim, S. A., & Sarfraz, S. U. (2016). Creativity is everyone's business: How to enhance employee creativity in telecommunication sector. *Annals of the University of Oradea, 25*(1), 515-524. Retrieved from https://doaj.org/toc/1582-5450

Keith, T. Z. (2014). *Multiple regression and beyond: An introduction to multiple regression and structural equation modeling*. New York, NY: Routledge.

Khan, A., Rehman, H., & ur-Rehman, S. (2016). An empirical analysis of correlation between technostress and job satisfaction: A case of KPK Pakistan. *Pakistan Journal of Library and Information Science, 14*(1), 9-15. Retrieved from http://www.pu.edu.pk/dlis/pjlis/index.html

King, M. F., & Bruner, G. C. (2000). Social desirability bias: A neglected aspect of validity testing. *Psychology and Marketing*, *17*(2), 79-103. doi:10.1002/(sici)1520-6793(200002)17:2%3C79::aid-mar2%3E3.0.co;2-0

Köffer, S., Ortbach, K., & Niehaves, B. (2014). Exploring the relationship between IT consumerization and job performance: A theoretical framework for future research. *Communications of the Association for Information Systems*, *35*(1), 261-283. Retrieved from http://aisel.aisnet.org/cais/

Korany, M. A., Abdine, H. H., Ragab, M. A., & Aborass, S. I. (2016). Investigation of using robust statistics: Weighted, parametric & nonparametric linear regression of derivative/discrete Fourier transform HPLC convoluted peak responses for handling standard addition method data in bioanalysis. *Bulletin of Faculty of Pharmacy, Cairo University*, *54*(2), 243-255. doi:10 .1016/j.bfopcu.2016.07.001

Korsakienė, R., Stankevičienė, A., Šimelytė, A., & Talačkienė, M. (2015). Factors driving turnover and retention of information technology professionals. *Journal of Business Economics and Management*, *16*(1), 1-17. doi:10. 3846/16111699.2015.984492

Lepp, A., Barkley, J. E., & Karpinski, A. C. (2014). The relationship between cell phone use, academic performance, anxiety, and satisfaction with life in college students. *Computers in Human Behavior*, *31*, 343-350. doi:10 .1016/j.chb.2013.10.049

Lightsey, O. J., Boyraz, G., Ervin, A., Rarey, E. B., Gharibian Gharghani, G., & Maxwell, D. (2014). Generalized self-efficacy, positive cognitions, and negative cognitions as mediators of the relationship between conscientiousness and meaning in life. *Canadian Journal of Behavioural Science/Revue Candienne Des Sciences Du Comportement, 46*(3), 436-445. doi:10.1037/a0034022

Liu, D., Li, T., & Liang, D. (2014). Incorporating logistic regression to decision-theoretic rough sets for classifications. *International Journal of Approximate Reasoning*, *55*(1), 197-210. doi:10.1016/j.ijar.2013.02.013

Liu, X., Ye, Y., Mi, Q., Huang, W., He, T., Huang, P., . . . Yuan, H. (2016). A predictive model for assessing surgery-related acute kidney injury risk in hypertensive patients: a retrospective cohort study. *PLoS ONE, 11*(11), 1-15. doi.10.1371/ journal.pone.0165280

López, M. I., Callao, M. P., & Ruisánchez, I. (2015). A tutorial on the validation of qualitative methods: From the univariate to the multivariate approach. *Analytica Chimica Acta*, *891*, 62-72. doi:10.1016/j.aca.2015.06.032

Lowry, P., D'Arcy, J., Hammer, B., & Moody, G. (2016). "Cargo cult" science in traditional organization and information systems survey research: A case for using nontraditional methods of data collection, including Mechanical Turk and online panels. *Journal of Strategic Information Systems*, *25*(3), 232-240. doi:10.1016/j.jsis.2016.06.002

Lucero, J., Wallerstein, N., Duran, B., Alegria, M., Greene-Moton, E., Israel, B., . . . Schulz, A. (2018). Development of a mixed methods investigation of process and outcomes of community-based participatory research. *Journal of Mixed Methods Research*, *12*(1), 55-74. doi:10.1177/ 1558689816633309

Lu, H., Zhao, Y., & While, A. (2019). Job satisfaction among hospital nurses: A literature review. *International Journal of Nursing Studies, 94*, 21-31. doi:10.1016/j.ijnurstu.2019.01.011

Marinova, S. V., Peng, C., Lorinkova, N., Van Dyne, L., & Chiaburu, D. (2015). Change-oriented behavior: A meta-analysis of individual and job design predictors. *Journal of Vocational Behavior*, *88*, 104-120. doi:10.1016 /j.jvb.2015.02.006

Mathieson, K. (2014). Making sense of biostatistics: Types of probability sampling. *Journal of Clinical Research Best Practices*, *10*(9). Retrieved from http:/firstclinical.com/journal/

McVicar, A. (2015). Scoping the common antecedents of job stress and job satisfaction for nurses (2000-2013) using the job demands-resources model of stress. *Journal of Nursing Management*, *24*(2), E112–E136. doi:10.1111/jonm.12326

Mesterova, J., Prochazka, J., Vaculik, M., & Smutny, P. (2015). Relationship between self-efficacy, transformational leadership and leader effectiveness. *Journal of Advanced Management Science*, *3*(2), 109-122. doi:10.12720/joams.3.2.109-122

Mirkovski, K., Lowry, P. B., & Feng, B. (2016). Factors that influence interorganizational use of information and communications technology in relationship-based supply chains: Evidence from the Macedonian and American wine industries. *Supply Chain Management: An International Journal*, *21*, 334-351. doi:10.1108/scm-08-2015-0343

Mokhber, M., Tan, G. G., Vakilbashi, A., Zamil, N. A. M., & Basiruddin, R. (2016). Impact of entrepreneurial leadership on organization demand for innovation: Moderating role of employees' innovative self-efficacy. *International Review of Management and Marketing*, *6*(3), 415-421. doi:10.1166/asl.2015.6078

Moksnes, U. K., Moljord, E. O., Espnes, G. A., & Byrne, D. G. (2010). The association between stress and emotional states in adolescents: The role of gender and self-esteem. *Personality and Individual Differences*, *49*, 430-435. doi:10.1016/j.paid .2010.04.012

Moura, D., Orgambídez-Ramos, A., & Gonçalves, G. (2014). Role stress and work engagement as antecedents of job satisfaction: Results from Portugal. *Europe's Journal of Psychology*, *10*(2), 291-300. doi:10.5964/ejop.v10i2 .714

Müller-Stewens, B., & Möller, K. (2017). Performance in new product development: A comprehensive framework, current trends, and research directions. *Journal of Management Control*, *28*(2), 157-201. doi:10.1007 /s00187-016-0243-4

Munyewende, P. O., Rispel, L. C., & Chirwa, T. (2014). Positive practice environments influence job satisfaction of primary health care clinic nursing managers in two South African provinces. *Human Resources for Health*, *12*(1), 1-14. doi:10.1186/1478-4491-12-27

Muzi, Z., Junyi, L., & Gaojun, Z. (2015). Which is better? A comparative analysis of tourism online survey and field survey. *Tourism Tribune/Lvyou Xuekan*, *30*(4), 95-104. doi:10.3969/j.issn.1002-5006.2015.04.009

Narbaev, T., & De Marco, A. (2014). An earned schedule-based regression model to improve cost estimate at completion. *International Journal of Project Management*, *32*(6), 1,007-1,018. doi:10.1016/j.ijproman.2013.12.005

Neumann, C. S., & Pardini, D. (2014). Factor structure and construct validity of the SelfReport Psychopathy (SRP) scale and the Youth Psychopathic Traits Inventory (YPI) in young men. *Journal of Personality Disorders*, *28*(3), 419-433. doi:10.1521/pedi_2012_26_063

Nieuwenstein, M. R., Wierenga, T., Morey, R. D., Wicherts, J. M., Blom, T. N., Wagenmakers, E. J., & van Rijn, H. (2015). On making the right choice: A meta-analysis and large-scale replication attempt of the unconscious thought advantage. *Judgment and Decision Making*, *10*(1), 1-17. Retrieved from http://journal.sjdm.org/

Norman, G. (2010). Likert scales, levels of measurement and the "laws" of statistics. *Advances in Health Sciences Education*, *15*, 625-632. doi:10. 1007/s10459-010-9222-y

Notomi, N., Tsukamoto, M., Kimura, M., & Yamamoto, S. (2015). ICT and the future of the retail industry: Consumer-centric retailing. *NEC Technical Journal*, *10*(1), 38-41. Retrieved from nec.com

Ossemane, E. B., Moon, T. D., Were, M. C., & Heitman, E. (2017). Ethical issues in the use of SMS messaging in HIV care and treatment in low-and middle-income countries: Case examples from Mozambique. *Journal of the American Medical Informatics Association*, *25*(4), 423-427. doi:10. 1093/jamia/ocx123

Ozyilmaz, A., Erdogan, B., & Karaeminogullari, A. (2017). Trust in organization as a moderator of the relationship between self-efficacy and workplace outcomes: A social cognitive theory-based examination. *Journal of Occupational and Organizational Psychology, 91*(1), 181-204. doi:10. 1111/joop.12189

Pantano, E. (2014). Innovation drivers in retail industry. *International Journal of Information Management*, *34*(3), 344-350. doi:10.1108/scm-08-2015-0343

Pantano, E., & Viassone, M. (2015). Engaging consumers on new integrated multichannel retail settings: Challenges for retailers. *Journal of Retailing and Consumer Services*, *25*, 106-114. doi:10.1016/j.jretconser.2015.04. 003

Parreño-Marchante, A., Alvarez-Melcon, A., Trebar, M., & Filippin, P. (2014). Advanced traceability system in aquaculture supply chain. *Journal of Food Engineering*, *122*, 99-109. doi:10.1016/j.jfoodeng.2013.09.007

Pederzoli, D. (2016). ICT and retail: State of the art and prospects. In F. Ricciardi & A. Harfouche (Eds.), *Information and communication technologies in organizations and society* (pp. 329-336). Cham, Switzerland: Springer.

Phillips, A. (2015). OH research: How to conduct surveys. *Occupational Health*, *67*(1), 27-30. Retrieved from Health Source: Nursing/Academic Edition. (Accession No. 100782746)

Poirier, E. A., Staub-French, S., & Forgues, D. (2015). Assessing the performance of the building information modeling (BIM) implementation process within a small specialty contracting enterprise. *Canadian Journal of Civil Engineering*, *42*(10), 766-778. doi:10.1139/cjce-2014-0484

Prion, S., & Haerling, K. A. (2014). Making sense of methods and measurement: Pearson product-moment correlation coefficient. *Clinical Simulation in Nursing*, *10*(11), 587-588. doi:10.1016/j.ecns.2014.07.010

Puth, M.-T., Neuhäuser, M., & Ruxton, G. D. (2014). Effective use of Pearson's productmoment correlation coefficient. *Animal Behaviour*, *93*, 183-189. doi:10.1016/j.anbehav.2014.05.003

Quan, H., Mao, X., Chen, J., Shih, W. J., Ouyang, S. P., Zhang, J., . . . Binkowitz, B. (2014). Multi-regional clinical trial design and consistency assessment of treatment effects. *Statistics in Medicine*, *33*(13), 2,191-2,205. doi:10.1002/sim.6108

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research*, *19*(4), 417-433. doi:10.1287/wasre.1070.0165

Rapp, A., Baker, T. L., Bachrach, D. G., Ogilvie, J., & Beitelspacher, L. S. (2015). Perceived customer showrooming behavior and the effect on retail salesperson self-efficacy and performance. *Journal of Retailing*, *91*(2), 358-369. doi:10.1016/j.jretai.2014.12.007

Rutkowski, D., & Delandshere, G. (2016). Causal inferences with large scale assessment data: Using a validity framework. *Large-Scale Assessments in Education*, *4*(1), 1-18. doi:10.1186/s40536-016-0019-1

Sant'Anna, P. H. C., & Song, X. (2019). Specification tests for the propensity score. *Journal of Econometrics, 210*(2), 379-404. doi:10.1016/j.jeconom. 2019. 02.002

Saravanan, A. S., Raj, J. R., Nalawade, S. V., & Seetharaman, A. (2018). Antecedents of radio frequency identification adoption in supply chain competitiveness. *International Journal of Business Management and Economic Research, 9*(4), 1,352-1,364. Retrieved from http://www.ijbmer.com

Schoemann, A. M., Boulton, A. J., & Short, S. D. (2017). Determining power and sample size for simple and complex mediation models. *Social Psychological and Personality Science*, *8*(4), 379-386. doi:10.1177/1948550617715068

Schwarzer, R., & Jerusalem, M. (1995). Self-efficacy measurement: Generalized self-efficacy scale (GSES). In J. Weinman, S. Wright, & M. Johnston, *Measures in health psychology: A user's portfolio* (pp. 35-37). Windsor, England: Nfer-Nelson.

Seltzer, J., & Bass, B. M. (1990). Transformational leadership: Beyond initiation and consideration. *Journal of Management, 16*(4), 693-703. doi:10.1177 /01492063 9001600403

Shapka, J. D., Domene, J. F., Khan, S., & Yang, L. M. (2016). Online versus in-person interviews with adolescents: An exploration of data equivalence. *Computers in Human Behavior*, *58*, 361-367. doi:10.1016/j.chb.2016.01. 016

Shin, S., & Eksioglu, B. (2015). An empirical study of RFID productivity in the U.S. retail supply chain. *International Journal of Production Economics*, *163*, 89-96. doi:10.1016/j.ijpe.2015.02.016

Shoji, K., Cieslak, R., Smoktunowicz, E., Rogala, A., Benight, C. C., & Luszczynska, A. (2016). Associations between job burnout and self-efficacy: A meta-analysis. *Anxiety, Stress, & Coping*, *29*(4), 367-386. doi:10.108010615806.2015.1058369

Short, J. L., Toffel, M. W., & Hugill, A. R. (2016). Monitoring global supply chains. *Strategic Management Journal*, *37*(9), 1878-1897. doi:10.1002 /smj.2417

Simon, M. K., & Goes, J. (2013). *Dissertation and scholarly research: Recipes for success*. Seattle, WA: Dissertation Success.

Singhal, R., & Rana, R. (2014). Intricacy of missing data in clinical trials: Deterrence and management. *International Journal of Applied & Basic Medical Research*, *4*(3), 2-5. doi:10.4103/2229-516X.140706

Smartt, C., & Ferreira, S. (2014). Exploring beliefs about using systems engineering to capture contracts. *Procedia Computer Science*, *28*, 111-119. doi:10.1016/j.procs. 2014.03.015

Sperandei, S. (2014). Understanding logistic regression analysis. *Biochemia Medica*, *24*(1), 12-18. doi:10.11613/bm.2014.003

Sreenu, N. (2017). Correlations among the corporate finance decision, governance and financial performance in emerging market value: The study in Indian context. *Journal of Commerce and Management Thought*, *8*(3), 616. doi:10.5958/0976-478x.2017.00038.6

Srivastava, S. C., Chandra, S., & Shirish, A. (2015). Technostress creators and job outcomes: Theorising the moderating influence of personality traits. *Information Systems Journal*, *25*(4), 355-401. doi:10.1111/isj.12067

Stern, M. J., Bilgen, I., & Dillman, D. A. (2014). The state of survey methodology: Challenges, dilemmas, and new frontiers in the era of the tailored design. *Field Methods*, *26*(3), 284-301. doi:10.1177/1525822X13519561

Subedi, B. P. (2016). Using Likert-type data in social science research: Confusion, issues and challenges. *International Journal of Contemporary Applied Sciences*, *3*(2), 36-49. Retrieved from http://www.ijcas.net

Tabachnick, B. G., & Fidell, L. S. (2014). *Using multivariate statistics* (New international ed.). Harlow, England: Pearson.

Tallodi, T. (2015). Mediation's potential to reduce occupational stress: A new perspective. *Conflict Resolution Quarterly*, *32*(4), 361-388. doi:10.1002/crq.21121

Tams, S. (2015, August). Challenges in technostress research: Guiding future work. In *Proceedings of the Twenty-First Americas Conference on Information Systems* (pp. 77-83). Red Hook, NY: Curran Associates. Retrieved from http://toc. proceedings .com/28505webtoc.pdf

Tams, S., Thatcher, J., Grover, V., & Pak, R. (2015). Selective attention as a protagonist in contemporary workplace stress: Implications for the interruption age. *Anxiety, Stress, & Coping*, *28*(6), 663-686. doi:10.1080/10615806.2015.1011141

Tarafdar, M., D'Arcy, J., Turel, O., & Gupta, A. (2015). The dark side of information technology. *MIT Sloan Management Review*, *56*(2), 61-70. Retrieved from https://sloanreview.mit.edu/

Tarafdar, M., Pullins, E. B., & Ragu-Nathan, T. S. (2014a). Examining impacts of technostress on the professional salesperson's behavioural performance. *Journal of Personal Selling & Sales Management*, *34*(1), 51-69. doi:10.1080/08853134. 2013.870184

Tarafdar, M., Pullins, E. B., & Ragu-Nathan, T. S. (2014b). Technostress: Negative effect on performance and possible mitigations. *Information Systems Journal, 25*(2), 103-132. doi:10.1111/isj.12042

Tarafdar, M., & Roy, R. K. (2003). Analyzing the adoption of enterprise resource planning systems in Indian organizations: A process framework. *Journal of Global Information Technology Management*, *6*(1), 31-51. doi:10.1080 /109 7198x.2003.10856342

Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S. (2007). The impact of technostress on role stress and productivity. *Journal of Management Information Systems*, *24*(1), 301-328. doi:10.2753 /mis0742-1222240109

Tarafdar, M., Tu, Q., & Ragu-Nathan, T. S. (2010). Impact of technostress on end-user satisfaction and performance. *Journal of Management Information Systems*, *27*(3), 303-334. doi:10.2753/mis0742-1222270311

Tarafdar, M., Tu, Q., Ragu-Nathan, T. S., & Ragu-Nathan, B. S. (2011). Crossing to the dark side: Examining creators, outcomes, and inhibitors of technostress. *Communications of the ACM*, *54*(9), 113-120. doi:10.1145 /1995376.1995403

Tarhan, A., & Yilmaz, S. G. (2014). Systematic analyses and comparison of development performance and product quality of incremental process and agile process. *Information and Software Technology*, *56*(5), 477-494. doi:10.1016/j.infsof. 2013. 12.002

Torkzadeh, G., & Doll, W. J. (1999). The development of a tool for measuring the perceived impact of information technology on work. *Omega*, *27*(3), 327-339. doi:10.1016/S0305-0483(98)00049-8

Tsiga, Z. D., Chong, A. Y. L., Pu, X., & Teh, P. L. (2017, Summer). Adoption of eSCM in centralized and decentralized manufacturing organizations. In *Proceedings of the Pacific Asia Conference on Information Systems* (pp. 145–179). Retrieved from https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1138&context=pacis2017

Tüzün, I. K., Çetin, F., & Basim, H. N. (2014). The role of psychological capital and supportive organizational practices in the turnover process. *METU Studies in Development*, *41*, 85-103. Retrieved from http://www2.feas. metu.edu.tr /metusd/ ojs/index.php/metusd

Ubale, H. D., & Dhabe, S. D. (2019). Study on major benefits of business process: Reengineering and its impact on productivity of small and medium sized enterprises. *International Journal of Management Studies*, *6*(1-2), 140-145. doi:10.18843/ijms/v6i1(2)/16

U.S. Department of Health and Human Services. (1979, April 18). *The Belmont report*. Retrieved from http://www.hhs.gov/ohrp/humansubjects /guidance/belmont.html

Van der Zijpp, T. J., Niessen, T., Eldh, A. C., Hawkes, C., McMullan, C., Mockford, C., . . . Seers, K. (2016). A bridge over turbulent waters: Illustrating the interaction between managerial leaders and facilitators when implementing research evidence. *Worldviews on Evidence-Based Nursing*, *13*(1), 25–31. doi:10. 1111/wvn.12138

Van Ginkel, J. R., Kroonenberg, P. M., & Kiers, H. A. L. (2014). Missing data in principal component analysis of questionnaire data: A comparison of methods. *Journal of Statistical Computation & Simulation*, *84*(11), 2,298-2,315. doi:10. 1080/009496 55.2013.788654

Vaske, J. J., Beaman, J., & Sponarski, C. C. (2017). Rethinking internal consistency in Cronbach's Alpha. *Leisure Sciences*, *39*(2), 163-173. doi:10.1080/01490400 .2015.1127189

Venkatesh, V., Brown, S. A., & Sullivan, Y. W. (2016). Guidelines for conducting mixed-methods research: An extension and illustration. *Journal of the Association for Information Systems*, *17*(7), 435-494. doi:10.17705 /1jais.00433

Vlachos, I. (2014). A hierarchical model of the impact of RFID practices on retail supply chain performance. *Expert Systems with Applications*, *41*(1), 5-15. doi:10.1016 /j.eswa.2013.07.006

von Bonsdorff, M. E., Janhonen, M., Zhou, Z. E., & Vanhala, S. (2015). Team autonomy, organizational commitment and company performance: A study in the retail trade. *International Journal of Human Resource Management*, *26*(8), 1,098-1,109. doi:10.1080/09585192.2014.934881

Wallace, M., & Sheldon, N. (2015). Business research ethics: Participant observer perspectives. *Journal of Business Ethics*, *128*(2), 267-277. doi:10.1007/s10551-014-2102-2

Wang, D., Gan, C., Wu, C., & Wang, D. (2015). Ethical leadership and employee voice: Employee self-efficacy and self-impact as mediators. *Psychological Reports*, *116*(3), 751-767. doi:10.2466/01.07.PR0.116k29w9

Wang, Y., Rodríguez de Gil, P., Chen, Y. H., Kromrey, J. D., Kim, E. S., Pham, T., . . . Romano, J. L. (2017). Comparing the performance of approaches for testing the homogeneity of variance assumption in one-factor ANOVA models. *Educational and Psychological Measurement*, *77*(2), 305-329. doi:10.1177/001316441 6645162

Wang, S., & Wu, P. (2008). The role of feedback and self-efficacy on web-based learning: The social cognitive perspective. *Computers & Education, 51*, 1589-1598. doi:10.1016/j.compedu.2008.03.004

Williams, M., Cafarella, P., Paquet, C., & Frith, P. (2015). Cognitive behavioral therapy for management of dyspnea: A pilot study. *Respiratory Care*, *60*, 1,303-1,313. doi:10.4187/respcare.03764

Wilson, V. (2014). Research methods: Sampling. *Evidence Based Library and Information Practice*, *9*(2), 45-47. doi:10.18438/B8S30X

Wood, S. K. (2014). Individual differences in the neurobiology of social stress: Implications for depression-cardiovascular disease comorbidity. *Current Neuropharmacology, 12,* 205-211. doi:10.2174/1570159X1166613112 0224413

Xanthnopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Reciprocal relationships between job resources, personal resources, and work engagement. *Journal of Vocational Behavior*, *74*(3), 235-244. doi:10.1016/j.vb.2008.11.003

Xu, S., Lu, B., Baldea, M., Edgar, T. F., Wojsznis, W., Blevins, T., & Nixon, M. (2015). Data cleaning in the process industries. *Reviews in Chemical Engineering, 31,* 453-490. doi:10.1515/revce-2015-0022

Yardley, S. J., Watts, K. M., Pearson, J., & Richardson, J. C. (2014). Ethical issues in the reuse of qualitative data: Perspectives from literature, practice, and participants. *Qualitative Health Research*, *24*(1), 102-113. doi:10.1177 /1049732313518373

Yang, Y., & Mathew, T. (2018). The simultaneous assessment of normality and homoscedasticity in linear fixed effects models. *Journal of Statistical Theory and Practice*, *12*(1), 66-81. doi:10.1080/15598608.2017.1320243

Yaripour, F., Shariatinia, Z., Sahebdelfar, S., & Irandoukht, A. (2015). The effects of synthesis operation conditions on the properties of modified γ-alumina nanocatalysts in methanol dehydration to dimethyl ether using factorial 192 experimental design. *Fuel*, *139*, 40-50. doi:10.1016/j.fuel.2014 .08.029

Yu, H., Jiang, S., & Land, K. C. (2015). Multicollinearity in hierarchical linear models. *Social Science Research*, *53*, 118-136. doi.10.1016/j.ssresearch.2015.04.00

Yuvaraj, N., & Pradeep Kumar, M. (2017). Study and evaluation of abrasive water jet cutting performance on AA5083-H32 aluminum alloy by varying the jet impingement angles with different abrasive mesh sizes. *Machining Science and Technology*, *21*(3), 385-415. doi:10.1080/10910344.2017 .1283958

Zakharov, A., Tsheko, G., & Carnoy, M. (2016). Do "better" teachers and classroom resources improve student achievement? A causal comparative approach in Kenya, South Africa, and Swaziland. *International Journal of Educational Development*, *50*, 108-124. doi:10.1016/j.ijedudev.2016 .07.001

Zamanzadeh, V., Ghahramanian, A., Rassouli, M., Abbaszadeh, A., Alavi-Majd, H., & Nikanfar, A. R. (2015). Design and implementation content validity study: Development of an instrument for measuring patient-centered communication. *Journal of Caring Sciences*, *4*(2), 165. doi:10.15171 /jcs.2015.017

Zhang, W., & Watanabe-Galloway, S. (2014). Using mixed methods effectively in prevention science: Designs, procedures, and examples. *Prevention Science*, *15*(5), 654-662. doi:10.1007/s11121-013-0415-5

Žliobaite, I., Hollmèn, J., & Junninen, H. (2014). Regression models tolerant to massively missing data: A case study in solar radiation nowcasting. *Atmospheric Measurement Techniques Discussions, 7,* 7,137-7,174. doi:10.5194/amtd-77137-2014

Zopiatis, A., Constanti, P., & Theocharous, A. L. (2014). Job involvement, commitment, satisfaction and turnover: Evidence from hotel employees in Cyprus. *Tourism Management*, *41*, 129-140. doi:10.1016/j.tourman.2013.09.013

Appendix A: Instrument Information Technology Works

Please circle a number between 1 and 5 to indicate the extent of your agreement with each item where 1 = *disagree* and 5 = *agree strongly*.

Item no.	Survey items	Disagree				Agree strongly
11.	I do not know enough about work-related technology to handle my job satisfactorily.	1	2	3	4	5
22.	I need a long time to understand and use new work-related technology.	1	2	3	4	5
33.	I do not have enough time to enhance and study my technology skills.	1	2	3	4	5
44.	I find recruits more knowledgeable about computer technology than I am.	1	2	3	4	5
55.	I often find it too complex to understand new work-related technologies.	1	2	3	4	5

From "The Impact of Technostress on Role Stress and Productivity" by M. Tarafdar, Q. Tu, B. S. Ragu-Nathan, & T. S. Ragu-Nathan, 2007, *Journal of Management Information Systems*, *24*(1), 301-328. doi:10.2753/mis0742-1222240109. Copyright 2007 by M. Tarafdar, Q. Tu, B. S. Ragu-Nathan, & T. S. Ragu-Nathan. Reprinted with permission.

Appendix B: Request to Use Technological Complexity Scale, Technological Self-Efficacy Scale, and Employee Productivity Scale

From: Kesha Walton

Sent: Thursday, October 18, 2018, 8:00 PM

To: Tarafdar, Monideepa

Subject: Technological complexity scale, technological self-efficacy scale, and employee productivity scale

Dear Dr. Tarafdar,

I am a doctoral student from Walden University writing my dissertation tentatively titled Relationship Between Technostress Dimensions and Employee Productivity under the direction of my dissertation committee chaired by Dr. Dusick. I would like your permission to reproduce to use survey instruments in my research study. I would like to use and print your surveys under the following conditions: I will include the copyright statement on all copies of the instrument, I will send my research study and one copy of reports, articles, and the like that makes use of these survey data promptly to your attention. If these are acceptable terms and conditions, please indicate by returning the letter through email.

Thank you for your consideration,

Kesha T. Walton

Doctoral Candidate

Appendix C: Permission to Use Technological Complexity Scale,
Technological Self-Efficacy Scale, and Employee Productivity Scale

From: Tarafdar, Monideepa <m.tarafdar@lancaster.ac.uk>
Sent: Thursday, November 1, 2018 4:06 PM
To: Walton, Kesha T.
Subject: RE: Permission to use instruments for my Dissertation at Walden

Hi Kesha,
The instruments are published in peer reviewed journals which anyone can read, so you can go ahead and use them as long as you cite the papers.
Good luck.
Monideepa

Appendix D: Survey Scales for Generalized Self-Efficacy

Please circle a number between 1 and 10 to indicate the extent of your agreement with each item where 1 = *disagree strongly* and 10 = *agree strongly.*

Item no.	Survey items	Disagree strongly ... Agree strongly
1	I manage and solve technology problems always if I try hard.	1 2 3 4 5 6 7 8 9 10
2	If I have problems with the technology, I can always find a way to get what I need and want.	1 2 3 4 5 6 7 8 9 10
3	Using technology at work allows me to accomplish my goals.	1 2 3 4 5 6 7 8 9 10
4	I am confident when dealing efficiently with unexpected technology events.	1 2 3 4 5 6 7 8 9 10
5	My technology knowledge was resourceful when handling unforeseen situations.	1 2 3 4 5 6 7 8 9 10
6	I can resolve most technology issues if I invest the necessary effort.	1 2 3 4 5 6 7 8 9 10
7	I utilize my coping strategies in order to remain calm when facing the technology difficulties.	1 2 3 4 5 6 7 8 9 10
8	When faced with technological problems, I can obtain several solutions.	1 2 3 4 5 6 7 8 9 10
9	I usually can find a good solution when my technology is not working.	1 2 3 4 5 6 7 8 9 10
10	I am capable of handling whatever comes my way when it comes to technology.	1 2 3 4 5 6 7 8 9 10

From "Impact of Technostress on End-User Satisfaction and Performance" by M. Tarafdar, Q. Tu, & T. S. Ragu-Nathan, 2010, *Journal of Management Information Systems*, *27*(3), 303-334. doi:10.2753/mis0742-1222270311. Copyright 2010 by M. Tarafdar, Q. Tu, & T. S. Ragu-Nathan. Reprinted with permission.

Appendix E: Survey Scales for Employee Productivity

Please circle a number between 1 and 4 to indicate the extent of your agreement with each item where 1 = *disagree* and 4 = *agree strongly*.

Item no.	Survey items	Disagree			Agree strongly
11.	The technology helps to improve the quality of my work.	1	2	3	4
22.	The technology helps to improve my productivity.	1	2	3	4
33.	The technology helps me to accomplish more work than would otherwise be possible.	1	2	3	4
44.	The technology helps me to perform my job better.	1	2	3	4

From "Analyzing the Adoption of Enterprise Resource Planning Systems in Indian Organizations: A Process Framework" by M. Tarafdar & R. K. Roy, 2003, *Journal of Global Information Technology Management*, *6*(1), 31-51. doi:10.1080/1097198x.2003.10856342.