E-leadership in Practice: The Components of Transformational Leadership in Virtual Business Environments

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E-leadership in Practice: The Components of Transformational Leadership in Virtual Business Environments

Abstract
Today more and more organizations increasingly conduct business using globally distributed teams, also called virtual teams, because of the availability and ubiquity of information and communication technology. E-leadership refers to leading through computer-mediated communication. In the field of e-leadership, transformational leadership has been studied for the past two decades and has been the most-often-cited leadership theory. The literature review discusses how transformational leadership behaviors affect team performance in the context of virtuality, in particular interpersonal trust and organizational commitment of the virtual team members. The researcher conducted a quantitative research study to examine (a) the relationships between transformational leadership and interpersonal trust and organizational commitment of virtual team members, (b) the impacts of the four constructs of transformational leadership via computer-mediated communication, and (c) the moderating effect of the degree of virtuality on such relationships. Study results indicate that transformational leadership behaviors positively affected interpersonal trust and organizational commitment of virtual team members. Among its four constructs, one particular construct—individualized consideration—had a more prominent role. Variety of practices moderated the relationship between transformational leadership and interpersonal trust. Practical implications and future research directions in the emerging field of transformational e-leadership are discussed. Future research directions are suggested.
E-leadership in Practice:
The Components of Transformational Leadership in Virtual Business Environments

By

Wei Xin Vought

Submitted in partial fulfillment
of the requirements for the degree
Ed.D. in Executive Leadership

Supervised by
Dr. J. Jason Berman

Committee Member
Dr. Mel F. Zuberi

Ralph C. Wilson, Jr. School of Education
St. John Fisher College

August 2017
Dedication

I dedicate my research to my family who has provided me with unconditional love and support. I would like to express my sincere appreciation and gratitude to my husband, Bill, my children, Kexin and Henry, and my parents Shijiao Xin (Grandpa) and Tinggui Fei (Grandma) for their unwavering support and understanding throughout the dissertation process. I am especially grateful for your assistance with getting me fed, allowing me enough sleep, and being so good at what you are doing. Without your assistance, I never would have done what I needed to do: weekend classes and everyday homework. More importantly, without your willingness and sacrifices in my absence, this would not have been possible. I love you all dearly and am grateful to have been blessed with you in my life.

Dr. Jason Berman and Dr. Mel Zuberi, I greatly appreciate your guidance, support, encouragement, and friendship throughout this journey. I value the time we spent together and our scholarly conversations. I have become, and am, a better person because of our interactions. A special thank you to Dr. Fionnuala Regan who met up with me at least once a week to go over my assignments and dissertation draft. I am lucky to have experienced this program with all of you.

To my team TCW², I could not have asked for a better team. Each member of TCW² brought value to the experience, and I have learned from each of you. I enjoyed learning with you. Our team exemplified effective collaboration, focused on our strengths, and appreciated each other as who we are!
As part of the Public Policy course, I decided to become a U.S. citizen and be more involved in community services and public life. Fortunately, I became a U.S. citizen before the end of the program. The Ed.D. Program is a life-changing program in this and many other senses. I would like to express my sincere appreciation to the staff at the Ed. D. program. Thank you for your instruction and guidance. I deeply value and appreciate your direction. Through this rigorous program, I received training and discipline to be a better scholar, researcher, and leader. This begins a life long journey, and I am grateful to have all of you with me.

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Biographical Sketch

Wei Xin Vought is originally from China, where she attended Huazhong University of Science and Technology and received her Bachelor of Arts in 1993. She went to St. John Fisher College and received her Masters of Business Administration in 2015. Wei has had 20 plus years of experience in project management in both China and the United States. She has worked in large multinational corporations, small startup companies, and not-for-profit organizations. She is a mother of two children and lives with her husband in Pittsford, New York. Wei is a passionate community volunteer and has worked at the Chinese School of Rochester and Chinese Institute of Rochester for the past 7 years. She co-founded the International School of Music and Arts of Rochester in 2012 that provides music lessons and entertainment to the community. As a community interpreter, Wei has helped hundreds of immigrants, international students, and visiting scholars to acclimate to living in the United States. Wei enrolled in the Ed. D. program at St. John Fisher College in May 2015 and pursued her research of virtual leadership under the direction of Dr. Jason Berman and Dr. Mel Zuberi. She received her Ed. D. degree in August 2017.
Abstract

Today more and more organizations increasingly conduct business using globally distributed teams, also called virtual teams, because of the availability and ubiquity of information and communication technology. E-leadership refers to leading through computer-mediated communication. In the field of e-leadership, transformational leadership has been studied for the past two decades and has been the most-often-cited leadership theory. The literature review discusses how transformational leadership behaviors affect team performance in the context of virtuality, in particular interpersonal trust and organizational commitment of the virtual team members. The researcher conducted a quantitative research study to examine (a) the relationships between transformational leadership and interpersonal trust and organizational commitment of virtual team members, (b) the impacts of the four constructs of transformational leadership via computer-mediated communication, and (c) the moderating effect of the degree of virtuality on such relationships. Study results indicate that transformational leadership behaviors positively affected interpersonal trust and organizational commitment of virtual team members. Among its four constructs, one particular construct—individualized consideration—had a more prominent role. Variety of practices moderated the relationship between transformational leadership and interpersonal trust. Practical implications and future research directions in the emerging field of transformational e-leadership are discussed. Future research directions are suggested.
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Chapter 1: Introduction

Background

Information technology has drastically changed the way society communicates. An increasing number of workplace activities involve computers and computer-mediated communication among individuals and across organizational boundaries (Townsend, DeMaire, & Hendrickson, 1998). Computer-mediated communication has become an important part of business communication, and it has facilitated the online and virtual business environments for the past three decades. It will remain indispensable for business communication for years to come. E-leadership is approach of leading within virtual environments where a significant amount of work, including communication, is supported by information and communication technology. According to Barnwell, Nedrick, Rudolph, Sesay, and Wellen (2014), there are two core components of e-leadership: communication and technology. Due to the almost ubiquitous nature of the Internet, access to computer-mediated communication has become increasingly convenient and affordable. A growing number of business organizations choose to conduct business virtually today to take advantage of the benefits it brings. Virtual team describes the remote work arrangement made possible by computer-mediated communication; other phrases about virtual teams include telecommuting, telework, distributed works, distributed teams, virtual office, virtual work, virtual workplace, virtual organization, and virtual community (Chang, Chuang, & Chao, 2011).
E-leadership in virtual business environments is the focus of this current study. Because of the increase in the globalization of business, there are more and more project teams dispersed in different geographic locations (Barnwell et al., 2014). According to a survey conducted by the Society for Human Resource Management in 2012, 66% of multinational and 46% of all organizations were using virtual teams in their workplace (Lepsinger & DeRosa, 2015). Multiple virtual environments exist, for instance, for education, e-commerce, entertainment, social media, business, sports, the military, and many other fields. Due to the popularity of conducting businesses online, the phenomena of leading within the virtual environments have been emerging and thriving, and they have been given new content, understanding, and application. Although still in its infancy, e-leadership has been a well-accepted concept since Avolio, Kahai, and Dodge created this term in 2001. Leadership in online and virtual environments is called e-leadership (Avolio et al., 2001; Phelps, 2014; Savolainen, 2013), or sometimes it is also called virtual leadership (Samartinho, Jorge, Jorge, & Manuel, 2014). Throughout this research paper, e-leadership and virtual leadership are used interchangeably.

For organizations, becoming global and doing business in virtual environments are corporate strategies, not simply a matter of organizational structure (Venkatraman & Henderson, 1998). Virtual teams are geographically and culturally dispersed in order to facilitate around-the-clock work and to allow the most qualified individuals to be assigned to a project team (Wakefield, Leidner, & Garrison, 2008). Such phenomena are altering global business and organizational boundaries, and they are removing limitations set by the workplace and working hours (Savolainen, 2013). The benefits of conducting businesses within virtual environments also include environmental friendliness, more
flexible work arrangements, less travel costs, and lower costs of running office premises (Pyoria, 2011). While there are benefits of conducting work through virtual teams, there are also problems associated with it. From a management perspective, problems of virtual teams include slower processing than anticipated during the team forming stage, lagging labor legislation, lacking occupational health and social interaction, stress and fatigue, and data security (Pyoria, 2011). From a leadership perspective, problems of virtual teams include low levels of cohesiveness, difficulty in establishing trust, conflicts, casual attributions, and a lack of mutual knowledge of context and access to dispersed knowledge (MacDuffie, 2007).

Virtual business environments are different from traditional face-to-face business environments in that team members are dispersed geographically, culturally, and temporally. Virtual team members belong to virtual teams where a significant amount of communication is conducted via computer-mediated communication. There are different types of virtual settings. From a structural perspective, there are intra-organizational virtual teams, which refer to remote work units within one company wherein different groups are operating in different locations; offshoring virtual teams wherein work is outsourced to a foreign country or countries; remote work, where team members spend at least one day a week working from home; and non-standard work arrangements wherein a lot of temporary work is done (MacDaffie, 2007). From a functional perspective, there are virtual settings working as a platform to perform tasks, as a shared space for team members to communicate, as a community to share resources, or as a network for businesses to develop (Jha & Watson-Manheim, 2007).
Understanding the work settings of virtual teams is important for leaders to determine how they can lead within such environments. Today most business environments are a hybrid of the traditional and virtual structure. Researchers have found some dimensions that contribute to the understanding of the “virtualness” of virtual business environments. “Virtualness,” or virtuality, means that the team members cannot “see it” or “hold it” yet still need to assume or perceive a functioning team (D’Eredita & Nilan, 2007). For instance, Fisher and Fisher (2001) found that time, space, and culture were three critical dimensions to a virtual working environment, and these three dimensions could formulate six types of virtual teams. Recent studies have discovered more dimensions of virtual environments, and researchers have created a questionnaire-style formula to measure the dispersion of a virtual team, such as the 12-question instrument developed by Chudoba, Wynn, Lu, and Watson-Manheim (2005).

Leading within virtuality is a sense-making and sense-giving behavior (D’Eredita & Nilan, 2007). Establishing a virtual reality (Crowston & Sieber, 2007) is the process where virtual leaders make their organizing behaviors within virtual teams similar to all other behaviors within traditional business environments. Virtual teams are a form of globally-distributed works where team members collaborate across boundaries, such as organizational and cultural boundaries, language barriers, time zones, geographic dispersion, and so forth. Barnwell et al. (2014) suggested that virtual leaders should develop good personal relationships between virtual team members who have shared experiences. Since there are two core components of e-leadership—communication and technology—virtual leaders and virtual team members should possess the following
traits: high-quality technical skills, political and general sensitivity, strong problem-orientation, strong goal-orientation, and high self-esteem (Barnwell et al., 2014).

Advanced information and communication technology has changed the way teams collaborate and the way leaders lead. Virtual leaders need to master various information and communication technology tools, while still maintaining high quality of communication. Practitioners and academia alike have been optimistic that various information and communication technology tools can help team leaders and members overcome distance to coordinate effectively (Cummings, Espinosa, & Pickering, 2007). Distance is one prominent feature of virtual business environments. According to MacDuffie (2007), there are four different types of distance for virtual teams: cultural, administrative or political, geographic, and economic. Virtual leaders face a different set of challenges within virtual business environments than in traditional face-to-face environments. Although studies found that temporal distance per se may not matter as much as other types of distance (Cummings et al., 2007; Espinosa, Nan, & Carmel, 2015), leaders still need to understand different cultures by overcoming the distances and barriers created by time and space.

Researchers (Nilan & Mundkur, 2007) have suggested that information and communication technology systems should not be seen solely as problem solvers, but also the means with which the leaders manage their teams. Put differently by Romano Jr., Pick, and Roztocki (2010), information and communication technology has two roles: an enabling role and a supporting role. Both roles have empowered the virtual leaders and virtual team members to be able to work across boundaries to achieve higher productivity and better outcomes. For instance, a simple technological intervention can reduce task
conflict in virtual teams, which improves shared understanding and team effectiveness. Researchers (Horwitz & Horwitz, 2007) have found that when individuals are different from their teams relating to demographic characteristics, such differences could have negative consequences for both individual and team outcomes. However, such pitfalls of diversity could be overcome by leveraging technology that suppresses surface characteristics (Windeler, Maruping, Robert, & Riemenschneider, 2015).

While trying to fully utilize technology, virtual leaders also need to consider the other core component of e-leadership, which is communication. Within traditional business environments, transformational leadership is widely practiced because transformational leadership behaviors can promote excellent communication between leaders and team members. Transformational leadership also predicts positive organizational effectiveness by affecting team performance through value congruence and trust (Chou, Lin, Chang, & Chuang, 2013; Hoxha, 2015). James Burns created transformational leadership in 1978. It has four major constructs: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration; these constructs are commonly known as the four “I”s. Idealized influence behaviors are behaviors leaders demonstrate to provide a role model for high ethical behaviors, to instill pride, and to gain respect and trust. Inspirational motivation behaviors are behaviors leaders take on when articulating a vision that is appealing and inspiring to team members. Intellectual stimulation behaviors are behaviors leaders demonstrate to challenge assumptions, take risks, and solicit team members’ ideas. Individualized consideration behaviors are behaviors leaders model to attend to each team member’s needs, listen to the member’s concerns and needs, and act as a mentor or coach to the
team member. The four “T’s of transformational leadership behaviors are believed to transform employees from ordinary to extraordinary performers (Burns, 1978).

Researchers reviewed the 10 top-tier academic journals for the period from 2000-2012 and found that transformational leadership theory was the most studied leadership theory. During this 12-year period, Ghasabeh, Soosay, and Reaiche (2015) found 154 publications for transformational leadership leading in the first position, while leader trait theories publications were 149 in the second position. Spector (2013) also contented that articles examining transformational leadership outnumbered all leadership articles using other theories—trait theory, path-goal theory, and leader-member exchange theory—combined. When implemented appropriately, transformational leadership was found to have implications for higher leadership effectiveness in the new market environment, and was an ideal leadership form in enabling firms to accomplish sustainable competitiveness as they operate in today’s global market (Ghasabeh et al., 2015).

Transformational leadership is arguably the most effective leadership style within virtual business environments. Researchers have found that transformational leadership behaviors within virtual business environments could lead to optimal virtual team outcomes and performance results. For instance, researchers found that transformational leadership generally was helpful for team functioning when transformational leaders used solution-based communication within virtual business environments (Lehmann-Willenbrock, Meinecke, Rowold, & Kaufffeld, 2015). Virtual teams that rated themselves highly on transformational leadership behaviors saw themselves as more potent over time and achieved a higher level of group performance (Park & Kwon, 2013; Purvanova & Bono, 2009). Greater sensitivity was attributed to transformational leaders, and
transformational leadership behaviors predicted empowerment, cohesion, and perceived group effectiveness (Ruggieri, 2009). Some studies suggested that organizations led by transformational leaders have achieved higher team creativity (Lee, Lee, Soe, & Choi, 2014; Saxena, 2014). Studies also revealed that transformational leadership attitudes challenged technology users to be more creative and critical in using the information and communication systems (Elkhani, Soltani, & Ahmad, 2014; Phipps & Prieto, 2011). Transformational leadership behaviors could also reduce turnover intention and actual turnover through enhancing team members’ emotional attachment and affective identification with their organization (Tse, Huang, & Lam, 2013).

Team members’ perceptions matter (Li, Chiaburu, Kirkman, & Xie, 2013). The researchers found that team members’ behaviors were not influenced by transformational leadership when team members perceived leaders as prototypical and if they were highly identified with their workgroups, not their leaders. When individuals within a team agreed in their perceptions, a team-level consensus about the team leader would emerge (Asif, Ayyub, & Bashir, 2014). Team members’ consensual perceptions about the quality of their leaders’ behaviors may be an important variable for understanding the influence of transformational leadership behaviors (Cole, Bedeian, & Bruch, 2011).

Trust is widely recognized as a key element of effective leadership (Torres & Bligh, 2012). Direct leaders, such as team leaders or supervisors, appeared to be a particularly important referent of trust in Dirks and Ferrin’s (2002) study. Transformational leadership arguably had a substantial relationship with trust (Salanova, Llorens, & Cifre, 2013). Using data collected from 39 teams through a questionnaire method, Chou et al. (2013) found a mediating role of cognitive trust between
transformational leadership and team performance. Although trust building was suspected to be more difficult in computer-mediated communication than in face-to-face environments, there was an increase in trust as computer-mediated communication increased (Purvanova & Bono, 2009). Virtual team members, who communicated via computer-mediated communication and had never met before, could develop trust over time (Wilson, Crisp, & Mortensen, 2013). Trust in leaders would be expected to play a greater role in fostering good virtual team collaboration (Hatem, Kwan, & Miles, 2012). There are different levels of trust within a complex organization, such as personal or dyadic trust, team trust, and organizational level trust. This study focuses on the interpersonal trust level of virtual team members in their virtual leaders because virtual teams are the building blocks of modern global businesses, and it is the team members’ perceptions that count and are fundamental to their levels of organizational commitment.

Organizational commitment plays a role in organizational effectiveness (Steers, 1977), well-being (Begley & Czajka, 1993), citizenship behavior (Organ & Ryan, 1995), and lower turnover rates (Hom, Katerberg, & Hulin, 1979; Somers, 1995). Researchers (Brooks, 2002; Jassawalla & Sashittal, 2003; Mcelroy, 2001) found that an organization’s success was partially determined by having a high level of organizational commitment, which is defined as a subordinate’s identification with the mission, goals, and vision of the organization. Organizations tend to look for committed employees in order to achieve their strategic objectives (Keskes, 2014). There are three types of organizational commitment: affective commitment that entails an acceptance and internalization of the organization’s goals and values, normative commitment that entails obligations to maintain employment membership and relationship, and continuance commitment that
involves appraisals of personal investments tied to current employment and the availability of employment alternatives (Meyer & Allen, 1991). Multiple studies suggest that transformational leadership was positively associated with organizational commitment in a variety of organizational settings and cultures (Avolio, Zhu, Koh, & Bhatia, 2004; Bono & Judge, 2003; Dumdum, Lowe, & Avolio, 2002; Walumbwa & Lawler, 2003; Walumbwa, Orwa, Wang, & Lawler, 2005). Virtual business environments have not been adequately studied in this aspect; therefore, this proposed study will include organizational commitment as one dependent variable.

**Problem Statements**

Due to the idiosyncrasies of conducting businesses virtually, virtual leaders need to understand the roles of technologies and to take into consideration what the dispersion of their globally distributed teams implies when it comes to their choice of virtual leadership behaviors. Understanding effective e-leadership styles potentially provides virtual leaders with theoretical insights and practical tools to lead globally distributed teams effectively.

Although transformational leadership has been the most chosen paradigm of leadership within virtual business environments, not all studies agree that transformational leadership behaviors lead to high levels of team performance; Whitford and Moss (2009) revealed that the utility of transformational leadership was primarily demonstrated in traditional environments rather than in virtual teams. The researchers believed that transformational leadership was influenced by the spatial distance between the team members and their leader; therefore, the benefits of transformational leadership behaviors in virtual teams were most likely to diminish if the distant team members only
pursued obligations rather than aspirations. Further research is necessary to verify how well transformational leadership works within virtual environments (Whitford & Moss, 2009), as well as which constructs of transformational leadership might work better than others.

Furthermore, characteristics of team virtuality may affect how teams perform (Kennedy, Vozdolska, & McComb, 2010). So far, there has been scant research dedicated to finding out the roles of the degree of virtuality in moderating the relationship between leadership behaviors and team performances. Therefore, to answer the calls for further research on the degree of virtuality (Chudoba et al., 2005; Kirkman & Mathieu, 2005; Maynard, Mathieu, Rapp, & Gilson, 2012; Politis, 2014; Purvanova & Bono, 2009; Zander, Mockaitis, & Butler, 2012), this study will explore the moderating effects of the degree of virtuality on the relationships between transformational leadership behaviors and the levels of virtual team members’ interpersonal trust and organizational commitment.

**Theoretical Rationale**

Transformational leadership is defined as a leadership approach that creates significant changes in individuals and organizations (Burns, 1978). Transformational leaders strive to change, elevate, and unify the goals of team members as well as inspire them to pursue challenging and shared objectives (Whitford & Moss, 2009). Transformational leadership is thought to influence performance directly and indirectly through its impact on employees’ satisfaction with their leadership and their affective commitment (Mitchell & Boyle, 2009). Real life examples of transformational leaders include U.S. President Franklin Roosevelt, Dr. Martin Luther King, Nelson Mandela.
from South Africa, Mahatma Gandhi from India, and Mao Zedong from China. They were leaders who created a strong connection with their followers by establishing a common vision and motivating the public to work toward common goals. In the business world, there have been many great transformational leaders as well, for example, Jim Lussier (CEO of St. Charles Medical System), Greg Delwiche (Vice President of Bonneville Power Administration), Jeanette Fish (Assistant Manager of Employment Service Programs, Oregon Employment Department), to name a few (Hacker & Roberts, 2004). A more famous example of transformational leadership in the business world is Warren Buffett who transformed a clothing manufacturer, Berkshire Hathaway, into a giant holding company that consistently outperforms its stock market peers. Countless transformational leaders in the business world have had profound influences on today’s global economy.

Transformational leadership has been the most frequently cited leadership theory not only in traditional leadership realm, but also in the e-leadership research area. There is evidence that transformational leadership is effective in virtual business environments. Transformational leadership was generally considered helpful for team functioning as it was linked to virtual team problem-solving processes due to its solution-focused communication (Lehmann-Willenbrock et al., 2015). Many attributes are associated with transformational leadership. The list of these attributes includes vision, trust, respect, risk sharing, modeling, integrity, communication to goals, commitments, enthusiasm, rationality, problem solving, personal attention, mentoring, listening, and empowerment (Elkhani et al., 2014). Arguably, transformational leadership had a significant impact on the manifestation of cognitive differences through these attributes, and transformational
leaders could also influence the utilization of available knowledge by facilitating open-minded interactions and debate (Mitchell & Boyle, 2009).

**Statement of Purpose**

The purpose of this study is to examine how leaders of globally distributed teams affect team members’ levels of interpersonal trust and organizational commitment through transformational leadership behaviors. This study also endeavors to test the moderating effects of the degree of virtuality on the relationships between transformational leadership interpersonal trust and organizational commitment of virtual team members.

**Research Questions**

Attributional theories (Conger & Kanungo, 1987; Shamir, 1992) and categorization theories (Lord, 1985; Lord & Maher, 1991; Yukl, 2010) suggest that team members are likely to view leaders as charismatic if they fit a profile; hence, leadership is in the eye of the beholder (Purvanova & Bono, 2009). Therefore, transformational leadership behaviors should be perceptions of virtual team members, not how the leaders claim their behaviors to be. Using transformational leadership as the lens, three research questions have been generated for this study:

1. How do virtual team members’ perceptions of transformational leadership behaviors affect virtual team members’ levels of interpersonal trust and organizational commitment?

2. How does each construct of transformational leadership behaviors perceived by virtual team members contribute to virtual team members’ levels of interpersonal trust and organizational commitment?
3. How does the degree of virtuality moderate the relationships between transformational leadership and outcomes, such as interpersonal trust and organizational commitment, within the context of virtual business environments?

Potential Significance of the Study

Due to the near ubiquity of information and communication technologies, it has become inevitable for organizations to do business with some degrees of virtuality. Research and studies have been conducted to understand the cognitive and affective changes during the transition from the traditional face-to-face business environments to computer-mediated virtual business environments. This study will add to the current understanding of the changes in modern leadership during such transitions as presented in existent studies. In particular, this study intends to examine which transformational leadership behaviors, or which construct, could lead to high levels of interpersonal trust and organizational commitment of their virtual team members, as well as what the roles of the degree of virtuality within virtual business environments are.

Since corporations are becoming increasingly global and virtual, research on how to lead effectively within virtual business environments is timely and relevant. Such research can potentially provide academia and practitioners with theoretical insights and practical tools for e-leadership. For instance, different training models for e-leaders and virtual team members can be devised from the research results. Potential training models include, but are not limited to, subjects such as communication with electronic media, clarification of goals and roles, balancing virtual work dynamics, development of intra-
team processes, conflict management for virtual team, and suggestions on how to avoid drawbacks of computer-mediated communication such as information overload.

Definitions of Terms

There are several key definitions in the e-leadership field. The term e-leadership was first created at the turn of the century, and it refers to a social influence process mediated by advanced information technology to produce a change in attitudes, feeling, thinking, and behaviors or performance with individuals, groups, or organizations (Avolio et al., 2001). The leaders that implement e-leadership are called e-leaders (Samartinho et al., 2014). E-leaders are affected by time, distance, and cultural considerations in how they actively shape their team members’ views (Avolio, Sosik, Kahai, & Baker, 2014). E-leaders are also called virtual leaders; thus, the two terms are used interchangeably throughout this paper.

There are three levels of e-leadership according to Avolio et al. (2014): micro-level, meso-level, and macro-level. E-leaders are those who lead on different e-leadership levels and strive to bring changes to individuals, business units or project teams, and the entire organization. They inspire virtual team members to achieve better performance. Because there are two core components of e-leadership—communication and technology—it is especially important for e-leaders to be competent in both communicating with their team members and commanding the technology to their advantage (Barnwell et al., 2014). Skills of successful virtual leaders are multifold and include “listening to see, creating aliveness, communicating effectively, and virtually coaching for peak performances” (Kerfoot, 2010, p. 118).
Interpersonal trust refers to the extent to which one is willing to ascribe good intentions to, and have confidence in, the words and actions of other people. Trust between individuals and groups within an organization is a highly important ingredient in the long-term stability of the organization and the well-being of its members (Cook & Wall, 1980). Organizational commitment refers to a person’s affective reactions to his or her employing organization. It is concerned with feelings of attachment to the goals and values of the organization, one’s role in relation to this, and commitment to the organization for its own sake rather than for its stated value (Cook & Wall, 1980). While trust is related to reliance and integrity, commitment is the belief that the relationship is worth working on to ensure its endurance (Morgan & Hunt, 1994). Morgan and Hunt found that trust and commitment had positive effects on the cooperation outcome and helped current leaders resist short-term alternatives in favor of long-term benefits.

Another key definition is virtual team. Virtual teams, also known as globally distributed works, conduct businesses in different locations around the world, relying on computers and the Internet for electronic communication, as well as videoconferencing for routine interactions. They are real teams with a collection of individuals who are interdependent on their tasks, share responsibility for outcomes, see themselves as an intact social unit embedded in one or more social systems, and collectively manage their relationships across boundaries (Hackman, Wageman, Ruddy, & Ray, 2000). They work while separated by geographic distance; hence, a significant amount of work is done virtually via computer-mediated communication, rather than face-to-face. Not all virtual teams are configured the same way. The teams differentiate each other in synchronicity across space and time, cultural and temporal distance, media intensity, team experiences,
and task virtuality (Orhan, 2014). The degree of virtuality measures and describes the configuration of virtual teams.

There are three other key terms. Computer-mediated communication is the key for virtual environments, where interaction is facilitated by the computer and via the Internet. Computer-mediated communication is the opposite of face-to-face communication. Face-to-face is used to describe traditional teams where a lot of interactions take place in real-time and in the same space. In some globally distributed works, face-to-face is not possible unless specific in-person travel and meetings are arranged. Popular information and communication technology tools include emails, instant messaging, and Webex or Skype; industry specific software for process flow and control such as SAP; and other company proprietary software tools.

Chapter Summary

There are benefits and problems associated with conducting businesses through globally distributed works. Today, more and more corporations are choosing to conduct businesses virtually to gain strategic advantages. This study is dedicated to examining e-leadership, which is an emerging concept that studies the leadership processes that take place within virtual environments. The five chapters of the dissertation are summarized below.

In Chapter 1, the concepts of e-leadership, the degree of virtuality, and transformational leadership are introduced. Transformational leadership is arguably an effective leadership style within virtual business environments. However, it is not without drawbacks and criticism. The purpose of this study is to find out how transformational leadership behaviors affect the levels of interpersonal trust and organizational
commitment of virtual team members. The study will also examine the moderating role of the degree of virtuality on the relationships between transformational leadership and interpersonal trust and organizational commitment. Problem statement, theoretical rationale, statement of purpose, research questions, and potential significance of the study are discussed. Definition of several terms, such as e-leadership, interpersonal trust, organizational commitment, virtual team, computer-mediated communication, and face-to-face communication are introduced.

In Chapter 2, an empirical literature review presents the state of the science in the e-leadership research field. After the overview of background information of e-leadership, key concepts such as virtual teams, the degree of virtuality, transformational leadership, interpersonal trust, and organizational commitment are explored in depth. At the end of Chapter 2, research gaps are identified based on the literature review.

Chapter 3 starts with the research model and hypotheses. It then discusses the methodology and sample collection. Data were collected from virtual team members of globally distributed works from a Fortune 500 company in northeastern part of the United Stated through an online survey. The survey asked questions about the four “I”s of transformational leadership and the degree of virtuality, as well as the virtual team members’ levels of interpersonal trust and organizational commitment. Sample size, data analysis methods, and steps moving forward are disclosed at the end of Chapter 3.

Chapter 4 displays the results of multiple regression analyses on the data collected. Demographic information of the survey respondents is displayed. Convergence and discriminant validity tests were conducted prior to the multiple regression analyses. Subsequently, descriptive data for the degree of virtuality, transformational leadership
behaviors, interpersonal trust, and organizational commitment are presented. Multiple regression analyses generated 12 equations. Based on these data and analyses, three research questions and 12 hypotheses are answered.

Chapter 5 covers the implication of the analysis findings from Chapter 4. The findings are discussed in three parts: transformational leadership, the degree of virtuality, and other findings. The concept of transformational e-leadership is proposed by the researcher. Managerial implications on e-leadership practice and social justice, research limitations, and future research directions are presented at the end of Chapter 5.
Chapter 2: Review of the Literature

The review of literature begins with a summary of theoretical and empirical findings related to transformational leadership in virtual business environments. Initial key search terms included e-leadership, virtual leadership, virtual teams, trust, transformational leadership, virtual competence, leadership, and leadership dimensions. After the initial search, more search terms were identified: virtuality, degree of virtuality, globally distributed works, virtual environments, remote team, telework, shared leadership, transactional leadership, and so forth.

Peer-reviewed journals were selected if they were printed in English; if their study field was business, project management, or IT related; if e-leadership, virtuality, transformational leadership, team performance, or trust was discussed; and if the journals were published within the past 10 years (2005-2015). The participants selected for all studies reviewed were part of a virtual team. Less than one third of the 150 studies reviewed for this current study used qualitative research methods. In the qualitative research studies, grounded theory research and case studies could help the researchers obtain insights into virtual environments; however, their findings are more conceptual than quantitative, helping researchers to generalize analytically, rather than statistically (Al-Ani, Horspool, & Bligh, 2011; Savolainen, 2013). Due to the nature of differences between qualitative and quantitative research, the latter usually involved many more participants in more geographic areas, nationalities, and cultures than the former.
Therefore, quantitative research methods seem to be preferred by many e-leadership researchers. In fact, over two thirds of the studies reviewed for this current study have used a quantitative experimental research method. Well-developed electronic surveys have made it possible for the researchers to measure and identify e-leadership behaviors and outcomes in a more precise manner and from a broader population than pen-and-paper surveys. When enough samples are obtained, quantitative research methods can use measurable data to formulate facts, uncover patterns, and identify relationships.

All research work in the literature review, including surveys, questionnaires, interviews, and observing activities, was conducted on experiences within virtual environments. Participants were from more than 31 different nationalities and countries, such as the United States, Australia, Canada, China, Finland, Germany, France, Iran, Mongolia, Pakistan, Portugal, Singapore, South Africa, Taiwan, Turkey, United Arab Emirates, to name a few. The purpose of the literature review is to present the state of science for e-leadership research. The remainder of this chapter will offer an overview of e-leadership, challenges of e-leadership, virtual teams, the degree of virtuality, transformational leadership in virtual environments, interpersonal trust, and organizational commitment.

**E-leadership Overview**

Information and communication technology has enriched electronic communication and facilitated the wider availabilities of resources and talents (Ocker, Huang, Trauth, & Purano, 2007). Technology has become part of the social transformation in business organizations and, in turn, part of the leadership realm (Avolio et al., 2001). Zigurs (2003) maintained that virtual business environments have afforded
the society a unique opportunity to redefine leadership. Virtual workplaces have transformed the traditional business mindset, and “it is clear that they are here to stay” (Lepsinger & DeRosa, 2015, p. 6). According to the Bureau of Labor Statistics (BLS, 2012), the virtual business platform industry and virtual business platform-related jobs may increase by as much as 44% from 2010–2020, when compared to the normal growth projection rate for all occupations, which is 14%. By 2018, the Fortune 500 will encompass on-demand learning, work-from-home management, decrease in physical assets, increase in digital competition, and open-information sharing which are potential components of virtual business platforms (Short, 2012). The United States Federal Government also issued the Telework Enhancement Act (2010) to provide all federal employees with the opportunities to work from remote. Since then, virtual work has become a strategic management tool for coping with potential disruptions in the workplace, as the means to reduce the overhead costs, and to reduce the real estate footprint of the Federal Government, while continuing to deliver timely services to the public (US Office OPM, 2015).

There are many benefits of running virtual business environments for organizations: It is environmentally friendly; there are more flexible work arrangements and lower costs of running office premises; it lessens traffic congestion in metropolitan areas, improves local air quality, and reduces greenhouse gas emission and pressure on the environment; it is a way of raising the company’s corporate image; there is better job control and well-being at the individual level and overall efficiency at the organizational level (Kitou & Horvath, 2003; Pyoria, 2011). Conine Jr. (2012) also confirmed some key benefits of conducting business in virtual environments: expanded reach of resources and
clientele, lowered operation costs, deeper dive into cost saving, reflection of reality in terms of benchmarking best practices, tailored learning for knowledge workers, and reduced disruption during work flows. Private sectors achieved millions of dollars of savings by conducting business in virtual environments (U.S. Office of Personnel Management, 2015). On the government side, the savings resulted from virtual work settings were significant as well. The U.S. Patent and Trademark Office (PTO) is widely considered a leader in telework within the Federal Government due to its wide implementation of the Telework Enhancement Act. The PTO realized $19.8 million in real estate savings as of August 2011 (US Office of Personnel Management, 2015).

However, there are also problems associated with working within virtual environments. According to MacDuffie (2007), barriers exist to achieving cohesion and trust within virtual environments, and there are usually conflicts, casual attribution, and difficulties in maintaining mutual knowledge and accessing dispersed knowledge within virtual environments. There are also potential conflicts resulting from team cultural diversity, large volumes of electronic communication, and a lack of immediacy of feedback in asynchronous media (Kankanhalli, Tan, & Wei, 2006-7). In addition, there could exist processes slower than normally anticipated, labor legislation issues, lack of occupational health and social interaction, as well as stress and fatigue, over time, and data security issues (Pyoria, 2011). According to Salanova et al. (2013), there are two types of technostress experiences—technostrain and technoaddiction—that cause fatigue and other physical and mental issues of virtual team members. Information and communication technology has enabled wider availability of resources and talents, but that does not lead to the social, physical, mental, and emotional availability of knowledge.
workers (Ocker et al., 2007). Ultimately, information and communication technology is not a problem solver but rather a support mechanism (Nilan & Mundkur, 2007).

Closely related to technostress, ergonomic considerations and cyber security require attention and awareness as well. Over the past two decades, more and more information and communication technology users have awareness of physical comfort and mental health issues associated with working in virtual environments. Proper ergonomic protection, appropriate tools, and necessary training need to be provided to virtual team members to achieve work and life balance by the management and leadership. Since cyber security is at the heart of any business’s sustainability, it should be on the top of the agenda of e-leadership (Pyoria, 2011).

E-leadership is defined as ways of leadership in which “individuals or groups are geographically dispersed and interactions are mediated by technology” (Avolio, Walumbwa, & Weber, 2009, p. 440). This is a relatively new research field where concepts become outdated and emerge relatively quickly. For instance, earlier researchers in the late 1990s and early 2000s tried to comprehend what e-leadership encompassed from different perspectives, but rapid technological changes quickly have made some concepts, such as anonymity within virtual environments, outdated (George & Sleeth, 2000). Anonymity means virtual team members would not know who else is online at the same time, which is usually not the case in today’s virtual environments. New concepts emerge simultaneously; for instance, virtuality was not a concept until after 2005, but it has become a critical component of e-leadership today.

E-leadership is also called virtual leadership. Virtual or e-leadership is multidimensional with characteristics differentiating it in important ways from traditional
leadership in offline settings (Faraj, Kudaravalli, & Wasko, 2015). Researchers have different understandings of e-leadership; according to Samartinho, Faíra, and Silva (2015), the emergent paradigm of e-leadership is composed of a body of knowledge organized in three categories: e-leadership, virtual teams, and technology—with technology being the common denominator as a platform to establish relationships. Virtual leadership can be viewed as a combination of skills and knowledge structures, which include cognitive abilities, cognitions, and meta-cognitions that contribute to performance (Serban et al., 2015). Zander et al. (2012) stated that there were three themes for globally distributed team leadership: leaders as boundary spanners, as bridge makers, and as blenders.

Researchers have found that performance in virtual teams can be increased through effective leadership (Gibson & Cohen, 2013; Iorio & Taylor, 2015). Some researchers looked at e-leadership from a skills and behavioral perspective (Krumm, Terwiel, & Hertel, 2013; Savolainen, 2013). After surveying 171 cross-cultural participants from 31 different nationalities, Krumm et al. (2013) found that virtual team members needed to embrace knowledge, skills, and abilities related to conscientious work to counteract the challenges of cue deprivation, heightened need for self-regulation, asynchronous communication, less salient work identities, and reduced trust and cohesion. Five e-leaders from five different industries were interviewed for Savolainen’s (2013) study. The interviewees thought that computer-mediated communication required virtual leaders to pay attention to many practical daily matters in trust-building and that skill development was necessary in virtual environments. Recently, some researchers have tried to establish a more comprehensive e-leadership model to fully understand and
promote e-leadership. A total of 293 e-leaders participated in Samartinho et al.’s (2014) experimental study, which created a model of e-leadership suggesting that operational coordination, training and education, and architecture and technological infrastructure were three critical pillars of a collaborative virtual environment, as displayed in Figure 2.1. The results also demonstrated that being able to communicate with members of different cultures is critical since virtual teams are usually located in different parts of the world (Samartinho et al., 2014).

Figure 2.1. Model for specific skills and characteristics in e-leadership. Adapted from “Good Practices in Virtual Leadership: The E-3Cs Rule (Communication, Trust and Coordination).” by Samartinho et al. 2014, the European Conference on Knowledge Management, 3, pp. 1272-1282.

Another study (Avolio et al., 2014) embraced the concept of total leadership where e-leadership was dissected into a few levels: micro-level (individuals and dyads), meso-level (groups and teams), and macro-level (organization and context). Through a comprehensive literature review, the researchers analyzed total leadership from the perspectives of traits, cognition, affect, and behaviors on the micro-level. They also argued that “the repeated appropriation of information technology generates or
transforms social structures, which over time became institutionalized” on the meso-level (Avolio et al., 2001, p. 621). Information and communication technology also increased information transparency, enabled the rise of social media, and facilitated geographical distance. Constant contact and the rise of tracking devices have affected the locus and mechanisms of leadership at this level as well. On the macro-level, Avilio et al. (2014) argued that not many studies have been done to examine the role of e-leadership and information and communication technology in facilitating or inhibiting organizational changes and its impact on leadership and organizational transformation. Gamification was another new concept of e-leadership that was worth studying, according to Avolio et al. (2014). Gamification means everything online will look like a game in the future, and it is one important social transformation originated from advanced information technology. Gamification will have a profound impact on leadership within virtual business environments.

**E-leadership Challenges**

Other than the definition by Avolio et al. (2009), there exist other similar definitions of e-leadership. Here are two examples:

1. “When an individual manages a group he or she do not see in person, leads a team that is dispersed geographically, or works within a team that is partially remote, this individual is part of the virtual workplace.” (Dinnocenzo, 2006, p. 14)

2. “E-leadership is a process of social influence that takes place in an organizational context where a significant amount of work, including
communication, is supported by information technology.” (Avolio & Kahai, 2010, p. 239)

All existing definitions confirm Barnwell et al.’s (2014) statement about e-leadership having two core components: communication and technology. Leading virtually implies that the virtual leader cannot intuitively “see it” or "hold it" yet would still assume or perceive a functioning team (D’Eredita & Nilan, 2007). Researchers found that communication media did have important effects on team interaction styles and cohesion (Hambley, O’Neill, & Kline, 2007). Kerfoot (2010) argued that the challenges of virtual leadership were the same as traditional leadership, but occurred in a much different venue where direct supervision and interaction were impossible. To maneuver within virtual environments freely, as one would do within the traditional face-to-face environments, virtual leaders need to master the skills for both communication and technology. Virtual environments for conducting businesses pose challenges for leaders who are used to leading in a traditional face-to-face environment. Leaders of virtual teams face a unique set of challenges, such as successfully influencing team members while relying on computer-mediated communication, building trust, sharing information, processing gains and losses, dealing with feelings of isolation, encouraging participation, and enhancing coordination and cohesion (Alistoun & Upfold, 2012).

To manage virtual teams effectively, virtual leaders need to understand the business environments they are dealing with. Challenges of mastering the technology, adjusting to cue-deprived communication environments, synergizing dispersed teams, and still achieving high productivity are new for today’s leaders. According to Furst, Reeve, Rosen, and Blackburn (2004), these challenges include logistical problems, such
as communicating and coordinating work across time and space; interpersonal concerns, such as establishing effective relationships with team members; and technology issues, such as identifying, learning, and using technology most appropriate for certain tasks.

It has become more difficult for e-leaders to act in transformational ways as the leaders need to manage the team members from a distance, while depending on contextual factors (Antonakis & Atwater, 2002). The distances between virtual leaders and virtual team members include team configuration, dimensions of distance, geographic distance, cultural distance, and temporal distance (Ocker, Huang, Berbunan-Fich, & Hiltz, 2011). Such distances create a series of challenges that did not exist in the traditional business environments. The optimal leadership configuration depends upon distance considerations (Ocker et al., 2011), and effective virtual leaders shorten these distances in order to gain interpersonal trust and organizational commitment. According to Siebdrat, Hoegl, and Ernst (2014), subjective distance is likely to predict important outcomes better than objective distance.

Using a case study method, Al-Ani et al. (2011) interviewed 16 employees across different organizational sites at a Fortune 500 company. The researchers found that upper management might not distinguish between co-located and distributed teams, that leader characteristics were similar in both types of teams, and respondents emphasized the importance of both task and process roles for “good” leaders in general (Al-Ani et al., 2011). Researchers (Rosen, Furst, & Blackburn, 2006) also identified critical functions required by virtual team leaders, including selecting team members with appropriate skills and experience to work virtually, monitoring virtual performance, recognizing and rewarding member contributions to the virtual teams, and managing external team
boundaries. Therefore, researchers (Samartinho et al., 2014) believed that the virtual leaders needed to possess these important skills or knowledge within virtual business environments: effective communication, trust-building potential, operational coordination, and the ability to promote effectiveness.

**Virtual Teams**

Virtual teams, also known as globally distributed works, conduct business in different locations around the world. They are real teams with a collection of individuals who are interdependent in their tasks, share responsibility for outcomes, see themselves and viewed by others as an intact social unit embedded in one or more social systems, and collectively manage their relationships across boundaries (MacDuffie, 2007). They work while separated by geographic distance. Work is done mostly via computer-mediated communication, rather than face-to-face. Advanced visualization and interaction techniques are often used by virtual teams to enhance team communication and collaboration (Bassanino, Fernado, & Wu, 2014).

Other than the definition by MacDuffie (2007), there are at least three other definitions of virtual teams:

1. Virtual teams consist of (a) two or more persons who (b) collaborate interactively to achieve common goals, while (c) at least one of the team members works at a different location, organization, or at a different time so that (d) communication and coordination is predominantly based on electronic communication media such as e-mail, fax, phone, and video conference (Hertel, Geister, & Konradt, 2005);
2. Virtual teams depend on computers for electronic communication, the Internet, and videoconferencing for routine interactions (Green & Roberts, 2010);

3. Members of a team who are geographically dispersed from one another, from their leader, or from both, are considered part of a virtual team (Cascio, 2000).

Based on the above definitions, researchers have concluded that there are six attributes of virtual teams (Berry, 2011):

1. The members of the team may be geographically dispersed (Johnson, Chanidprapa, Yoon, Berrett, & LaFleur, 2003);

2. The members of the team predominately rely on computer-mediated communication rather than face-to-face communication to accomplish their tasks (Maznevski & Chudoba, 2000);

3. The members of the team function interdependently, usually with a shared sense of purpose that is either given to them or constructed by the team itself (Alderfer, 1987);

4. The team usually, but not always, has a definable and limited membership, and there is awareness by team members of this shared membership; even if membership changes somewhat, the team remains intact (Alderfer, 1987);

5. The members of the team collectively manage their relationships across (and perhaps between) organizational boundaries (Hackman, 1987);

6. The members of the team are jointly responsible for outcomes (Hackman, 1987).
There are three broad categories of teams: traditional (co-located), virtual (completely distributed), and semi-virtual or hybrid (containing both local and remote members), according to Webster and Wong (2008) and Sarker, Ahuja, Sarker, and Kirkeby (2011). The limitations of electronic communication could negatively affect team members’ perceptions of their remote members (Burke, Aytes, Chidambaram, & Johnson, 1999). There are also four modes for multi-disciplinary teams to collaborate: face-to-face, synchronous distributed, synchronous, and asynchronous distributed (Bassanino et al., 2014). Studies revealed that virtual teams that were distributed to different degrees may experience different kinds of dynamics than completely co-located or completely distributed groups would do (O'Leary & Cummings, 2007). For instance, Bazarova and Walther (2009) found that when a virtual group was split among two or three geographical subgroups, with several members at each location, greater conflict occurred than in completely distributed or co-located groups, especially when participants perceived greater homogeneity elsewhere.

Just like traditional teams, virtual teams also go through different stages. Furst et al. (2004) maintained that there were four stages of virtual teams: forming, storming, norming (midpoint), and performing; each stage had different leadership challenges. Hertel et al. (2005) maintained that there were five stages of virtual teams: preparation, launch, performance management, team development, and disbanding. Purvanova and Bono (2009) found that the typical virtual project team was characterized by temporary life span and membership, spatial dispersion, and the use of predominantly computer-mediated communication.
In addition, multi-teaming is an emerging concept in the e-leadership field. Multi-teaming means virtual team members reside on more than one team at once. Researchers have not formed a consensus on whether multi-teaming is another discontinuity or an elemental characteristic of team participation, or whether multi-teaming has a positive effect on team performance in virtual environments (Chudoba et al., 2005). Comprehension of multi-teaming will complement the understanding and application of e-leadership.

**Degree of Virtuality**

Based on the different features and characteristics of virtual teams, researchers have been trying to come up with ways to measure virtuality. More recent literature addressing leadership within virtual business environments and globally distributed works has presented some consistent themes. The following themes have become the center of research and understanding: the degree of virtuality, or face-to-face interaction; the degree of media richness in technology used by leaders to establish a virtual presence; types of leader emergence (assigned, shared, or emergent); types and the degree of communication by distributed team leaders; and the degree of trust within globally distributed teams (Al-Ani et al., 2011; Chudoba et al., 2005; Ocker et al., 2011).

The concepts of virtuality and the degree of virtuality, therefore, have been created based on these themes. Virtuality is defined as discontinuities, gaps, or a lack of coherence in different aspects of work, such as work setting, tasks, and relations with other workers or managers (Watson-Manheim, Chudoba, & Crowston, 2002). The degree of virtuality is sometimes called virtuality index. Virtuality refers to the virtual business teams in terms of geographic distribution, organizational and national culture,
information and communication media usage, task interdependence, and other important factors of virtual business environments. There are two types of virtuality: team virtuality and task virtuality (Orhan, 2014). Team virtuality is defined as the extent to which team members use virtual tools to coordinate and execute team processes, the amount of informational value provided by such tools, and the synchronicity of team members’ virtual interaction (Kirkman & Mathieu, 2005). Task virtuality reflects similar components while also checking the interdependence of the tasks. Based on the current literature review, team virtuality is more frequently studied than task virtuality.

Researchers have different approaches in understanding team virtuality. Table 2.1 lists how different researchers understood the dimensions of team virtuality. The degree of virtuality measures or describes the dimensions of virtual teams or virtual tasks. Over time, researchers have agreed on assessing team virtuality as a continuum rather than an on-off dichotomy (Al-Ani et al., 2011; Griffith, Sawyer, & Neale, 2003; Kanawattanachai & Yoo, 2007). At one end of this continuum is the traditional concept of a team where communication is synchronous with minimal use of any type of technology or virtual tools. At the other end of the continuum is the completely distributed team, which is high in virtual tools usage, low in media richness, and completely asynchronous across one or more dimensions (Kirkman & Mathieu, 2005). Due to the ubiquity of the Internet, a pure face-to-face business environment is becoming less prominent. Most business environments are a hybrid of the traditional and virtual structures. As long as people occasionally rely on computer-mediated communication in addition to face-to-face interactions to cooperate on tasks, the work setting has a degree of virtuality (Chudoba et al., 2005).
Table 2.1

*Dimensions of Team Virtuality*

<table>
<thead>
<tr>
<th>Authors and Publication Year</th>
<th>Dimensions of Team Virtuality</th>
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<tr>
<td>Al-Ani, Horspool &amp; Bligh, 2011</td>
<td>- Geographical dispersion</td>
</tr>
<tr>
<td></td>
<td>- Communication process which encompasses communication intensity and medium</td>
</tr>
<tr>
<td></td>
<td>- Employment permanence</td>
</tr>
<tr>
<td>Chudoba, Wynn, Lu &amp; Watson-Manheim, 2005</td>
<td>- Geography</td>
</tr>
<tr>
<td></td>
<td>- Time Zone</td>
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<td>- Culture</td>
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<td>- Work practice</td>
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<td>- Organization</td>
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<td></td>
<td>- Technology</td>
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<td>Fisher &amp; Fisher, 2001</td>
<td>- Space</td>
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<td></td>
<td>- Time</td>
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<td></td>
<td>- Culture</td>
</tr>
<tr>
<td>Krumm, Twerwiel &amp; Hertel, 2013</td>
<td>- Extent of digital media use</td>
</tr>
<tr>
<td></td>
<td>- Synchronicity of team members’ interactions</td>
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<tr>
<td></td>
<td>- Information value provided by digital media</td>
</tr>
<tr>
<td></td>
<td>- Cultural diversity</td>
</tr>
<tr>
<td>Lu, Watson-Manheim, Chudoba &amp; Wynn, 2006</td>
<td>- Physical distance</td>
</tr>
<tr>
<td></td>
<td>- Time spent apart on tasks</td>
</tr>
<tr>
<td></td>
<td>- Level of technology support</td>
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<tr>
<td>Ocker, Huang, Berbunan-Fich &amp; Hiltz, 2011</td>
<td>- Geography</td>
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<tr>
<td></td>
<td>- Culture</td>
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<td>- Temporal distance</td>
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Chudoba et al. (2005) started the research of virtuality with six factors in mind: geography, time zone, culture, work practice, organization, and technology. Using a web-based survey, the researchers obtained 1,269 responses from virtual team members within the Intel Corporation. A three-step hierarchical regression analysis was run for the data collected, and the results showed that practice consistency could compensate for other
discontinuities. Three dimensions were found to be more closely associated with the degree of virtuality: team distribution, workplace mobility, and variety of practices (Chudoba et al., 2005). Chudoba et al. developed a 12-question instrument to measure the degree of virtuality based on their findings of these three constructs. This current study has adapted the 12-question instrument, which is formative for the e-leadership research area to measure the degree of virtuality within the research context.

Team distribution is defined as the degree to which people work on teams with members who are distributed over different geographic and time zones, relying upon collaboration technologies. Workplace mobility is defined as the degree to which employees work in environments other than regular offices, including different office sites, home, airports, and places outside the workplace. Variety of practices is defined as the degree to which the employees experience technology and work process diversity on their teams.

Using in-depth interviews and a survey method, Lu, Watson-Manheim, Chudoba, and Wynn (2006) obtained some important findings about the degree of virtuality, such as that mobility has a negative impact on communication effectiveness; that distances, even across national and cultural boundaries, were not hurdles for effective teamwork; that there was no relationship between team distribution and team performance, including mutual trust among team members; and that variety in practices interfered with the perception of team communication, work coordination, trust, and timely completion of projects.

Distance is often associated with virtual environments. But researchers have found that certain types of distance did not impact outcomes. To be more specific, there
was no direct relationship between spatial or temporal boundaries and team performance (Cummings et al., 2007). Temporal distance per se may not matter as much; team interaction causes variations. Espinosa et al.’s (2015) study showed that temporal distance could be effectively bridged by selecting the most appropriate communication pattern and turn-taking to convey and converge on information as needed to meet the performance goals of the team. While objective distance measures had no impact on team collaboration, subjective distance had a significant impact on team collaboration (Siebdrat et al., 2014). Researchers (Kirkman, Rosen, Tesluk, & Gibson, 2004) also found that team empowerment was a stronger predictor of team performance when the teams were in higher degree of virtuality than in lower degree of virtuality, using virtuality as a moderator.

Some other studies demonstrate negative associations between the degree of virtuality and communication, integration, coordination, trust, experienced meaningfulness, experienced responsibility, and team performance (Cramton & Webber, 1999; Gibson & Cohen, 2003; Peñarroja, Orenjo, Zornoza, & Hernadez, 2013). Consistent with these findings, O’Leary and Cummings (2002) found that frequency of communication is negatively related to the degree of virtuality. Consequently, virtual team members face greater challenges to communicating effectively (McDonough, Kahn, & Barczak, 2001). Webster and Wong’s (2008) findings also imply that the degree of virtuality can be important to team functioning. In particular, semi-virtual teams appeared to differ from both co-located and virtual teams. For instance, virtual team members experienced higher local group perceptions than members of co-located teams did (Webster & Wong, 2008).
Based on the different and sometimes conflicting findings about the functions of the degree of virtuality, it would be worthwhile to conduct a study to examine its moderating effect on the relationship between leadership behaviors and team outcomes, as suggested by Kirman and Mathieu (2005) and Phelps (2014). As a result, virtual leaders can be better informed on how to optimize their virtual teams’ structures, how to overcome certain challenges, and how to utilize the advantages brought by virtual teams.

**Transformational Leadership in Virtual Environments**

**Transformational leadership in virtual teams.** The most prominent leadership approaches in the field of e-leadership are transformational leadership, shared leadership, transactional leadership, and leader trait theory. Transformational leadership is the more popular choice as there is evidence that this approach is positively related to interpersonal trust, commitment, team performance, team effectiveness, team empowerment, customer satisfaction, and other key performance indexes (Avolio et al., 2014). Transformational leadership has four main dimensions, commonly known as four “I”s: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass, 1985). The four “I”s of transformational leadership behaviors have the following attributes as listed in Table 2.2 (Elkhani et al., 2014). These four “I”s transform employees from ordinary performers to extraordinary performers as the attributes guide leadership behaviors toward positive and lasting changes (Elkhani et al., 2014). Idealized influence behaviors are those behaviors that leaders demonstrate to provide a role model for highly ethical behaviors, to instill pride, and to gain respect and trust. Inspirational motivation behaviors are behaviors that leaders take on when articulating a vision that is appealing and inspiring to team members. Intellectual stimulation behaviors are
behaviors that leaders demonstrate to challenge assumptions, take risks, and solicit team members’ ideas. Individualized consideration behaviors are behaviors that leaders model to attend to each team member’s needs, listen to the member’s concerns and needs, and act as a mentor or coach to the team member.

Table 2.2

Transformational Leadership Behavior Attributes

<table>
<thead>
<tr>
<th>Transformational leadership behaviors</th>
<th>Attributes</th>
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<tbody>
<tr>
<td>Idealized (charismatic) influence</td>
<td>Vision</td>
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<tr>
<td></td>
<td>Trust</td>
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<tr>
<td></td>
<td>Respect</td>
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<td></td>
<td>Risk-sharing Delegation</td>
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<td></td>
<td>Integrity</td>
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<td></td>
<td>Modeling</td>
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<td>Inspirational motivation</td>
<td>Commitment to goals</td>
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<td></td>
<td>Communication</td>
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<td></td>
<td>Enthusiasm</td>
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<tr>
<td>Intellectual stimulation</td>
<td>Rationality</td>
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<tr>
<td>Individualized consideration</td>
<td>Problem solving</td>
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<td></td>
<td>Personal attention</td>
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<td></td>
<td>Mentoring</td>
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<td>Listening</td>
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<td></td>
<td>Empowerment</td>
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Transformational leadership is an ideal leadership form that could enable firms to accomplish sustainable competitiveness as they operate in global markets (Ghasabeh et al., 2015). Studies have shown that transformational leadership increases employee and organizational performance; increases employee commitment, loyalty, and satisfaction; reduces social loafing; and lessens stress in the workplace (Spector, 2013). Jung and
Sosik (2002) have found that transformational leadership predicted empowerment, cohesion, and perceived group effectiveness. There was a positive relationship between transformational leadership and perceived usefulness of information and communication technology (Elkhani et al., 2014). Sosik, Kahai, and Avolio (1998) reported that higher levels of transformational leadership were associated with higher levels of elaboration and originality.

There is strong evidence that transformational leadership is effective in virtual business environments. Transformational leadership predicts positive organizational effectiveness by affecting team performance through value congruence and trust (Chou et al., 2013; Hoxha, 2015). With data collected from 39 teams using a questionnaire method, Chou et al. found a mediating role of cognitive trust between transformational leadership and team performance. Transformational leadership was generally considered helpful for team functioning as it was linked to functional team problem-solving processes due to its solution-focused communication (Lehmann-Willenbrock et al., 2015). Using a videotaping method, Lehmann-Willenbrock et al. studied 30 virtual teams and found that transformational leadership was positively linked to functional problem-solving communication by team members. The results also showed that, although transformational leadership was not directly related to team members’ average frequency of solution-focused communication, the effect of a transformational leadership style on team members’ communication was mediated by leaders’ solution-focused communication. E-leaders’ solution-focused statements inhibited subsequent counterproductive statements by team members, such as running off topic, criticizing others, and complaining (Lehmann-Willenbrock et al., 2015).
Depending on the degree of virtuality, action-embedded transformational leadership might have a strategic influence on system development, e-leadership effectiveness, and transformation of technology vision (Eseryel & Eseryel, 2013). The researchers conducted 25 in-depth interviews with key informants from different Apache Software Foundation Conferences between 2006 and 2010. Their research revealed that perceived transformational leadership behaviors of the leaders helped convey and put in place strongly held beliefs and values, that transformational leadership actions stimulated innovative problem solving, and that perceived transformational leadership actions generated high degrees of team member confidence in their virtual leaders (Eseryel & Eseryel, 2013). Transformational leadership arguably had a stronger effect in teams that used only computer-mediated communication, and leaders who increased their transformational leadership behaviors in such teams achieved higher levels of team performance when compared to face-to-face teams (Purvanova & Bono, 2009). In their experimental study, Purvanova and Bono had 29 virtual leaders observed and evaluated. Their analysis at the team level revealed that the effect of transformational leadership on team performance was stronger in virtual teams than in face-to-face teams.

Due to the idiosyncrasies of the virtual business environments, transformational leaders should pay special attention to how they communicate their intentions. Based on an interdisciplinary review of literature of transformational leadership research, Mitchell and Boyle (2009) found it to be essential for transformational leaders to learn how to engender positive emotions, inhibit negative emotions, and inspire team members toward a shared goal. It is through open-minded interaction and debate that transformational leaders can achieve high team performance in the virtual business environment (Mitchell
Balthazard, Waldman, and Warren (2009) used a focus group and a control group to conduct their research to assess the emergence of transformational leadership within both virtual and conventional settings. Their research revealed that media type moderated the relationship between personality and the perceived emergence of transformational leadership; that activity level, communication, and expression quality predicted the emergence of perceived transformational leadership in virtual team; and that linguistic quality and grammatical complexity significantly predicted the emergence of transformational leadership (Balthazard et al., 2009).

Finally, the relationship between transformational leadership behaviors and team members’ behavioral outcomes was contingent on various team member perceptions and characteristics, such as team identification and individual differences (Li et al., 2013). Richardson and Vandenberg (2005) stated that the perceptions of managers’ leadership became the filter through which an organization’s leadership efforts were recognized by the employees and an important mechanism through which employees perceived a climate of involvement. When individuals within a unit agreed in their perceptions, a unit-level commitment could emerge. Using data collected from 196 team members and their leaders situated in 55 workgroups in two Chinese organizations, Li et al. (2013) found that team members’ buying-in was not influenced by transformational leadership when team members were highly identified with their work groups and perceived leaders as prototypical. Applying structural equation modeling using a field sample of 81 knowledge and manufacturing teams from a Danish company, Fausing, Joensson, Lewandowski, and Bligh (2015) also demonstrated that team members’ perceptions were critical in leader-team member relationships. Therefore, transformational leadership
behaviors measured for this study are all perceived transformational leadership behaviors in the eyes of the virtual team members. Put differently, it does not matter whether the leaders claim themselves to be transformational; it is the team members’ perceptions that count.

**Competing theories.** Besides transformational leadership, other leadership theories also work well within virtual environments. One of those theories is shared leadership, which is defined as a “dynamic, interactive influence process among individuals of a group for which the objective is to lead one another to the achievement of group or organizational goals or both” (Fuller & Harding, 2015, p. 732). Studies have shown that shared leadership has transformational, transactional, directive, individual empowering, team empowering, and aversive parts (Fausing et al., 2015; Ocker et al., 2011). Shared leadership is positively related to knowledge sharing and team creativity regardless of virtuality (Hoch & Kozlowski, 2014). After involving 71 students from three campuses within one North American university in real task projects carried out for Fortune 100 companies, Ocker et al. (2011) found that the teams with shared leadership exhibited an awareness of member capabilities that was indicative of a larger shared understanding of the talents and abilities of members. Overall, the majority of assigned leaders exhibited weaker leadership compared to emergent leaders (Ocker et al., 2011). Shared leadership explains unique variances in team performance over and above that of vertical leadership (Nicolaides et al., 2014). However, another study failed to find support for the idea that the more shared leadership there was across the members of a team, the better the team’s performance (Mehra, Smith, Dixon, & Robertson, 2006). In addition, coaching by an external leader was an important precursor for shared leadership (Carson,
A substantial difference between transformational leadership and shared leadership is that the latter does not have a top-down process between formal leaders and team members (Mehra et al., 2006); therefore, it would be hard for the team or the organization to handle market uncertainties and fluctuations (Bass, 1999).

Transactional leadership is another competing theory of transformational leadership. Transformational leadership is described as centered on managing the interpersonal relationships between people while transactional leadership is focused on facilitating the execution of tasks in the creation of products (Iorio & Taylor, 2015). Researchers (Kahai, Jestire, & Huang, 2013) found that both transformational and transactional leadership affected team discussion satisfaction directly and positively. When compared with transactional leadership, transformational leadership was associated with lesser group efficacy and solution originality (Kahai, Sosik, & Avolio, 2003). One study measured task performance of 228 undergraduate students and found that transformational leadership and transactional leadership were equally effective in predicting team outcomes when the communication medium was considered (Hambley et al., 2007). However, a majority of the literature reviewed indicated that within virtual environments, a transformational leadership style was more satisfying than a transactional leadership style, and a transformational leader was judged to be more effective than a transactional leader (Ruggieri, 2009). The advantage of transformational leadership over transactional leadership was that it enhanced organizational effectiveness by increasing the levels of organizational trust and psychological empowerment (Hoxha, 2015). Kahai et al.’s (2013) results indicated that while transformational leadership increased cognitive effort, transactional leadership reduced it.
Leader trait theory suggests three important leader traits: communication competency, environmental alertness, and influence power (Zhang & Fjermestad, 2006). Some researchers suggested that individual personality characteristics played an important role in the success of leaders who had training and development programs and, consequently, the success of leaders in a virtual environment (Eissa, Fox, Webster, & Kim, 2012). However, results for a trait approach had disparity across different cultures (Nicholson, Sarker, Sarker, & Valacich, 2007). Furthermore, leadership in virtual environments is a combination of skills and knowledge structures, but since leader trait theory lacks the knowledge part, it makes leader trait theory a weaker choice than transformational leadership theory.

**Criticism of transformational leadership.** Some contrasting evidence exists, however, concerning the efficacy of transformational leadership. One study argues that the utility of transformational leadership was better demonstrated in traditional environments than virtual teams; therefore, many of the messages transmitted by transformational leaders were degraded if not conveyed in person (Whitford & Moss, 2009). After surveying 165 employees from a broad, random sample of small, medium, and large public and private organizations in various countries, the researchers found that the utility of transformational leadership was primarily demonstrated in traditional environments rather than in virtual teams. Since the spatial distance between the team members and the leader might have influenced transformational leadership, the benefits of a transformational leadership style in virtual teams were most likely to diminish if the distant team members pursued obligations rather than aspirations (Whitford & Moss, 2009). Another study found that transformational leadership decreased quantitative
performance in three-person virtual teams, but increased qualitative performance, leadership satisfaction, and group cohesion in teams of larger sizes (Hoyt & Blascovich, 2003). Furthermore, when compared with transactional leadership, transformational leadership was associated with lesser group efficacy and solution originality (Kahai et al., 2003).

One popular perspective is that transformational leadership theory is overly idealistic and can romanticize traditional leadership behaviors (Spector, 2013). Spector used the example of Lee Iacocca of Ford and Chrysler to demonstrate over-attribution as the core flaw of this theory. According to Spector, Iacocca’s leadership skills were closer to the traditional transactional leadership. However, since the performance outcomes were once so great, it was easy to mistake them for transformational outcomes. A close analysis of Iacocca’s words and actions revealed that he was more of a transactional leader and an effective CEO than a transformational leader during his tenure at Chrysler from 1978-1992. The fact that Chrysler quickly fell behind its competitors after the mid-1980s and faced its second financial crisis in 1991 undermines the claim of substantial transformation brought by Iacocca’s leadership (Spector, 2013).

Another criticism is that transformational leadership could be manipulated into pseudo-transformational leadership where the leaders exploit lower-level staff by ascribing more importance to their own interests while neglecting the well-being of their team members. Pseudo-transformational leaders focus mainly on their own interests and aims, rather than that of the whole group (Northouse, 2010). Famous examples of pseudo-transformational leaders in the political world include Adolf Hitler and Bin
Laden. In the business world, Enron, WorldCom, Tyco, and Lehman Brothers scandals all involved some pseudo-transformational leaders.

Transformational leadership may not work in situations in which tasks are enormously complex and beyond the skill level of the average group members (Whitford & Moss, 2009). Some organizations, such as hospitals, may be weakly receptive to transformational leadership as well (Vandenberghe, 1999). In the case of virtual business environments, the levels of task interdependence might have a direct impact on the effectiveness of transformational leadership. The degree of virtuality might also impact the effectiveness of transformational leadership (Politis, 2014). Further research is needed to explore the roles of the degree of virtuality on the relationship between transformational leadership behaviors and team performances (Politis, 2014).

It is also argued that transformational leadership is leader-centric, and greater agency is attached to the leader rather than the team members (Anderson & Sun, 2015). This is problematic if the current and future business context requires leadership that is distributed and power is shared with team members. Furthermore, transformational leadership may not be applicable to everyone (Anderson & Sun, 2015). Since relationships are mutual, the success of transformational leadership also depends on the personalities and receptivity of the team members. Team member characteristics, such as motivational needs or self-esteem, may moderate the extent to which team members respond to transformational leadership (Qu, Janseen, & Shi, 2015). The relationship between transformational leadership and the team members’ behavioral outcomes is contingent on various team member perceptions and characteristics, such as team identification and individual differences (Li et al., 2013). For people who like to be
directed and maintain the status quo, transactional leadership might be more suitable. Finally, when team members engage in greater networking behaviors, the effects of transformational leadership behaviors decrease as well (Anderson & Sun, 2015).

**Interpersonal Trust**

“The requirement of leadership is to earn trust” (Denton, 2009, p. 3). Trust is defined as an individual’s or group’s belief that another individual or group will make efforts to uphold commitments, will be honest, and will not take advantage given the opportunity (Cumming & Bromiley, 1996). Trust is seen as being more critical in virtual environments than in traditional team settings (Cascio & Shurygailo, 2003), and it is a necessary condition for successful work in virtual teams (Child, 2001). Trust functions like the glue that holds and links distributed team members together when they cannot monitor each other (Lai & Burchell, 2008). There are different types of trust within virtual environments. There are swift trust and knowledge-based trust (Robert Jr., Dennis, & Hung, 2009) from a team-forming perspective. There are also affective trust and cognitive trust from a psychological perspective. Cognitive trust refers to individual beliefs about peer reliability and dependability (McAllister, 1995). From a structural perspective, trust comes at different levels: personal or dyadic, team, and organizational level (Byron, 2008). Recently, trust and the new ways of interaction have developed into central issues of e-leadership (Bergum, 2009). Trust building has been recently recognized as one of the leader’s key tasks (Yukl, 2010), and trustworthiness in virtual environments can be built up from different forms of interactions (Savolainen, 2013). This current study focuses on trust on the personal level within virtual environments.
Interpersonal trust refers to the extent to which one is willing to ascribe good intentions to and have confidence in the words and actions of other people (Cook & Wall, 1980). Trustworthiness consists of three dimensions of competence, benevolence, and integrity (Mayer, Davis, & Schoorman, 1995). In leadership practice, it is manifested in open communication, expertise, fairness, and good intentions (Hakkinen, 2012). This study has adapted the scale of interpersonal trust at work by Cook and Wall (1980). The scale has four constructs: faith in the intentions of management, which is defined as one’s willingness to believe in the trustworthiness of management’s intentions; confidence in the actions of management, which is defined as one’s willingness to believe in the ability of the management; faith in the intentions of peers, which is defined as willingness to believe in the trustworthy intentions of one’s peers; and confidence in the actions of peers, which is defined as one’s willingness to believe in the ability of one’s peers.

Trusting relationships were constructed when e-leaders clarify work goals, perform task repetition, set up shared work and communication norms, and ensure regular interactions and immediate feedback (Jawadi, Daassi, Favier, & Kalika, 2013). Trust is also positively related to knowledge sharing, which is very important in virtual business environments (Tsai, Ma, Lin, Chiu, & Chen, 2014). Al-Ani et al.’s (2011) study revealed that reduced trust could erode work performance, increase turnover intentions, reduce employees’ support for management, and hinder employees’ overall adjustment to work in virtual contexts.

Direct leaders, such as supervisors, appear to be a particularly important referent of trust (Dirks & Ferrin, 2002). Trust in a leader was frequently found to mediate the leadership-outcome relationship in studies of leadership processes (Dirks & Ferrin, 2002;
Empirically, Raghuram, Garud, Wiesenfeld, and Gupta (2001) found that virtual worker perceptions of mutual trust between themselves, their manager, and organizational peers played an important role in the worker’s adjustment to virtual work. Greater perceptions of mutual trust are related to higher levels of adjustment to virtual work (Merriman, Schmidt, & Dunlap-Hinkler, 2007). Dirks (2000) found that trust in teammates had no effect on team performance, whereas trust in leadership had a substantial effect (Dirks & Ferrin, 2002).

Naturally, interpersonal trust building within a virtual environment is different from a traditional environment. Technological changes in terms of physical infrastructures, tasks, and social dimensions can lead to differing levels of trust. Trust may not reach the same level in computer-enabled relationships as in traditional environments (Jarvenpaa, Shaw, & Staples, 2004). While it can be expected that establishing trust among collaborators was more difficult in computer-mediated communication than in face-to-face communication, there was an increase in trust as computer-mediated communication continued (Hatem et al., 2012).

Therefore, virtual leaders need to take all work and interactions with the team members into account. Geographic distance, cultural differences, time zones, and behavioral etiquette require the leaders to pay special attention when communicating with their team members (Savolainen, 2013). The interviewees in Savolainen’ study also thought that computer-mediated communication required virtual leaders to pay attention to many practical daily matters in trust building, and that virtual leaders perceived communication within virtual environments as challenging. Meanwhile, e-leaders’
behaviors, including virtual competence, have a direct effect and play a crucial role on interpersonal trust building within virtual business environments. There are some basic e-leadership qualities to trust building: honesty, open-mindedness, cultural insights, and optimism (Samartinho et al., 2015). Research has also shown that leadership distance is a key determinant of the level of employee trust in their direct leader and an organization’s top leadership (Torres & Bligh, 2012).

Interpersonal trust is constructed when e-leaders clarify work goals, perform task repetition, set up shared work and communication norms, and ensure regular interactions (Jawadi et al., 2013). After surveying 193 French employees at a well-known French training center, Jawadi et al. found that mentoring and facilitation positively influenced leader-team member relationships. Their research demonstrated that encouraging the expression of opinions, seeking consensus, being aware of individual needs, and paying attention to cultural differences could also help e-leaders build and maintain trust in their teams (Jawadi et al., 2013). Researchers also found that transformational leadership has a substantial link to trust (Chou et al., 2013). Among the variables associated with the transformational leadership process, trust has been acknowledged as one important factor that can mediate the effects of transformational leadership on group outcomes (Braun, Peus, Weisweiler, & Frey, 2013). Researchers have found that a transformational leader could facilitate team members’ trust in the leader (Jung & Avolio, 2000) and mutual trust among team members (Zhu, Newman, Miao, & Hooke, 2013).

**Organizational Commitment**

Organizational commitment is defined as “the strength of an individual’s identification with and involvement in a particular organization” (Porter, Steers,
Mowday, & Boulian, 1974, p. 604). It has one or more of the following attitudinal elements: a strong belief in and acceptance of the organization’s goals and values, a willingness to exert considerable effort on behalf of the organization, and a strong desire to maintain membership in the organization (Shaw, Delery, Jenkins, & Gupta, 1998). Again, this study has adapted the scale of organizational commitment from Cook and Wall (1980). The scale has three constructs for organizational commitment: organizational identification, organizational involvement, and organizational loyalty. Organizational identification is defined as the pride in the organization and one’s internalization of the organization’s commitment. Organizational involvement is defined as one’s psychological absorption in the activities of one’s roles. And, organizational loyalty is defined as affection for and attachment to the organization, as well as a sense of belongingness manifesting as a “wish to stay” (Cook & Wall, 1980, p. 40).

Studies have found that transformational leadership is positively associated with organizational commitment in various traditional organizational settings. A total of 147 Italian state employees participated in Pierro, Raven, Amato, and Belanger’s (2013) first study and 261 Italian employees from a large energy research organization in their second study. The participants took surveys on transformational leadership behaviors and answered questions on their commitment level anonymously. Both studies indicated that the more participants reported having a transformational leader, the more willing they became to comply with soft, not harsh, power controls. In turn, greater willingness to comply with soft power controls increased one’s affective organizational commitment. In another study, the researchers surveyed 250 employees from the textile industry in Punjab, Pakistan, and the results indicated that there was a significant relationship
between a transformational leadership style and organizational commitment (Asif et al., 2014). After surveying 193 remote workers in a medium-sized organization operating in Dubai, United Arab Emirates, Politis (2014) also found that the e-leadership of managing by results, not activity, had significant influence on team members’ commitments. When virtual leaders provided specific, measurable, and attainable goals to the virtual team members, interpersonal trust and organizational commitment levels of the team members increased (Politis, 2014).

The commitment-trust theory maintains that those networks characterized by relationship commitment and trust engender cooperation (Morgan & Hunt, 1994). Transformational leadership arguably affects performance directly and indirectly through its effect on subordinate’s satisfaction with their leadership and their affective commitment (Mitchell & Boyle, 2009). Transformational leadership behaviors could also reduce turnover intention and actual turnover through enhancing team members’ emotional attachments and affective identifications with their organization (Tse et al., 2013). A small and virtual organization can maintain a shared imagined community using selection, socialization, and other processes needed to compensate for being completely virtual. Researchers (Plavin-Mastnerman, 2015) have argued that it was possible to develop an integrated, shared culture that included employees’ feeling committed to the organization even when they were working virtually.

**Chapter Summary**

This chapter explored the state of science in the e-leadership field. Key concepts such as e-leadership, virtual team, the degree of virtuality, transformational leadership, interpersonal trust, and organizational commitment have been discussed. An extensive
literature review was carried out to further understand these concepts. As massive flows of information move in and around the organization, it is important for the virtual leaders to select, interpret, and utilize such information for the success of their organizations (Savolainen, 2013). Although the virtual environment is built upon the abundance of information or the technology that transfers the information, e-leadership is not only about information or technology. It is still about people and relationships where trust forms as a foundation for cooperation and knowledge sharing (Savolainen, 2013).

Seamless transitions between virtual work and local face-to-face work has become an increasingly important capability of both the virtual leaders and the virtual team members (Wang & Haggerty, 2011). Sufficient training for virtual leaders and members was necessary to increase their virtual competence, according to Savolainen (2013) and Samartinho et al. (2014). Some researchers were interested in the roles the degree of virtuality plays on the relationship between virtual leadership and its outcomes (Chudoba et al., 2005; Kirkman & Mathieu, 2005; Politis, 2014; Purvanova & Bono, 2009). Others tried to find out what leadership styles are the most effective and what else matters within a virtual business environment (Eseryel & Eseryel, 2013; Lehmann-Willenbrock et al., 2015; Politis, 2014).

The majority of the articles reviewed argued that transformational leadership was the most popular theory chosen for virtual leadership studies. The benefits of transformational leadership within virtual environments are multifold. However, not all studies agree that transformational leadership behaviors within virtual environments lead to optimum results. A study by Whitford and Moss (2009) addressed the question of whether the benefits of transformational leadership extended into virtual environments. It
is equally important to obtain team members’ perceptions to determine whether the perceived leadership behaviors did indeed correspond to actual communication styles (Fausing et al., 2015; Lehmann-Willenbrock et al., 2015; Li et al., 2013). Politis (2014) also observed that providing virtual feedback and support had a significant negative effect on the commitment dimension, and improving virtual communication had a significant negative effect on the trust dimension. Therefore, further research is necessary to verify whether transformational leadership works within virtual environments, and if so, how well it works (Whitford & Moss, 2009).
Chapter 3: Research Design Methodology

Introduction

To answer the research questions, inquiry that aims at examining the relationships between transformational leadership and interpersonal trust and organizational commitment within virtual business environments is worth pursuing. Corporations are becoming increasingly global and virtual; therefore, such research on how to lead effectively within virtual business environments is timely and relevant. It is also important to examine the roles of the degree of virtuality in such relationships. Figure 3.1 illustrates the research model, where the degree of virtuality is the moderator of the relationships between transformational leadership behaviors and interpersonal trust and organizational commitment. Table 3.1 displays the independent variable, moderating variable, and dependent variables for this study. The independent variable has four constructs, the moderating variable has three constructs, and the dependent variables have seven constructs combined (four for interpersonal trust and three for organizational commitment). Based on the research model, breakdown constructs of these variables, and the research questions, an expanded research model was created and is displayed in Figure 3.2. Hypotheses formulated based on the research questions and the expanded research model for transformational leadership in virtual business environments are listed after Figure 3.2.
Figure 3.1. Research model for transformational leadership in virtual teams.

Table 3.1

IV, MV, and DVs

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<thead>
<tr>
<th>Type of constructs</th>
<th>Second order constructs</th>
<th>Constructs</th>
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<tbody>
<tr>
<td>Independent variable</td>
<td>Transformational Leadership Behaviors (TFL)</td>
<td>Idealized influence (TFL_II)</td>
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<td></td>
<td></td>
<td>Inspiration motivation (TFL_IM)</td>
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<td></td>
<td></td>
<td>Individualized consideration (TFL_IC)</td>
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<td></td>
<td></td>
<td>Intellectual stimulation (TFL_IS)</td>
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<tr>
<td>Moderating variable</td>
<td>Degree of Virtuality (DoV)</td>
<td>Team distribution</td>
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<td>Workplace Mobility</td>
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<td>Variety of practices</td>
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<tr>
<td>Dependent variable1</td>
<td>Interpersonal Trust</td>
<td>Faith in (the intentions of) management</td>
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<td>Faith in (the intentions of) peers</td>
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<td>Confidence in (the actions of) management</td>
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<td>Confidence in (the actions of) peers</td>
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<tr>
<td>Dependent variable2</td>
<td>Organizational Commitment</td>
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<td>Organizational involvement</td>
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<td></td>
<td></td>
<td>Organizational loyalty</td>
</tr>
</tbody>
</table>
Figure 3.2. Expanded research model for transformational leadership in virtual environments.

Four sets of hypotheses were formulated based on the research questions and the expanded research model for transformational leadership in virtual business environments as displayed in Figure 3.2:

1. H1a: Perceived transformational leadership behaviors in aggregate within virtual business environments are positively related to the level of interpersonal trust of the team members.
   - H1a-1: Virtual leaders’ idealized influence behaviors as perceived by virtual team members are positively related to the virtual team members’ interpersonal trust.
• H1a-2: Virtual leaders’ inspirational motivation behaviors as perceived by virtual team members are positively related to the virtual team members’ interpersonal trust.

• H1a-3: Virtual leaders’ individualized consideration as perceived by virtual team members are positively related to the virtual team members’ interpersonal trust.

• H1a-4: Virtual leaders’ intellectual stimulation behaviors as perceived by virtual team members are positively related to the virtual team members’ interpersonal trust.

2. H1b: Perceived transformational leadership behaviors in aggregate within virtual business environments are positively related to the level of organizational commitment of the team members.

• H1b-1: Virtual leaders’ idealized influence behaviors as perceived by virtual team members are positively related to the virtual team members’ organizational commitment.

• H1b-2: Virtual leaders’ inspirational motivation behaviors as perceived by virtual team members are positively related to the virtual team members’ organizational commitment.

• H1b-3: Virtual leaders’ individualized consideration behaviors as perceived by virtual team members are positively related to the virtual team members’ organizational commitment.
• H1b-4: Virtual leaders’ intellectual stimulation behaviors as perceived by virtual team members are positively related to the virtual team members’ organizational commitment.

3. H2a: The relationship between perceived leaders’ transformational leadership behaviors and interpersonal trust of the team members is moderated by the degree of virtuality of the work environment, such that the higher the degree of virtuality, the stronger the effectiveness of the transformational leadership behaviors becomes.

• H2a-1: The relationship between perceived leaders’ transformational leadership behaviors and interpersonal trust of the team members is moderated by the degree of virtuality of the work environment, such that the higher the team distribution, the higher the levels of interpersonal trust.

• H2a-2: The relationship between perceived leaders’ transformational leadership behaviors and interpersonal trust of the team members is moderated by the degree of virtuality of the work environment, such that the higher the workplace mobility, the higher the levels of interpersonal trust.

• H2a-3: The relationship between perceived leaders’ transformational leadership behaviors and interpersonal trust of the team members is moderated by the degree of virtuality of the work environment, such that the higher the variety of practices, the higher the levels of interpersonal trust.
4. H2b: The relationship between perceived leaders’ transformational leadership behaviors and organizational commitment of the team members is moderated by the degree of virtuality of the work environment, such that the higher the degree of virtuality, the stronger the effectiveness of the perceived transformational leadership behaviors becomes.

- H2b-1: The relationship between perceived leaders’ transformational leadership behaviors and organizational commitment of the team members is moderated by the degree of virtuality of the work environment, such that the higher the team distribution, the higher the levels of organizational commitment.

- H2b-2: The relationship between perceived leaders’ transformational leadership behaviors and organizational commitment of the team members is moderated by the degree of virtuality of the work environment, such that the higher the workplace mobility, the higher the levels of organizational commitment.

- H2b-3: The relationship between perceived leaders’ transformational leadership behaviors and organizational commitment of the team members is moderated by the degree of virtuality of the work environment, such that the higher the variety of practices, the higher the levels of organizational commitment.

**Research Design**

An extensive literature review revealed that most of the studies in the e-leadership area have adopted a quantitative research approach. Quantitative survey research methods
can generally reach participants in more geographic areas, nationalities, and cultures than qualitative methods. A survey method was used, therefore, to ask participants to assess their e-leaders’ behaviors, the degree of virtuality of the virtual business environments, and their levels of interpersonal trust and organizational commitment.

**Research Context**

The current research study was conducted in a large Fortune 500 corporation in the northeastern part of the United States. This company has multiple internal, globally distributed teams and organizations, providing printing, documentation, transaction processing, content management, communication and marketing, and workflow automation services within a global context. At the time of the survey, the company had 140,000 employees worldwide and experienced a major organizational restructuring, which lasted for all of 2016. Mutual trust plays a key role in successful international alliances (Uber Crosse, 2002), and it is highly important in virtual teams that face uncertainty and have incomplete knowledge of all the group members (Child, 2001). Therefore, the intent of this study was to find out how well transformational leadership worked within the virtual business environments at this particular company, where changes were imminent.

**Research Participants**

Convenience sampling was conducted within one of the employee caucus groups at the company, which had about 870 employees. Most of the caucus group members worked with some degree of virtuality. About two thirds of this caucus group were between 41 and 60 years old. About 90% of the caucus members worked for the company for more than 3 years, with a majority having more than 11 years of work experiences at
the company. The first two questions of the survey asked the respondents to confirm that they had a virtual leader for more than 1 year. Those who did not have a virtual leader or those who had worked for their virtual leader for less than 1 year did not qualify to complete the survey. The third question asked the respondents to confirm that they would assess one virtual leader on one virtual team only, if they were on multiple teams.

**E-leadership Survey**

The E-leadership Survey is an online survey that was developed for this study to examine the hypotheses generated from the research questions and expanded research model. The survey consists of 69 questions; most of the questions were adapted from a review of three empirical studies: Cheung, Ng, Lam, and Yue (2001); Chudoba et al. (2005); and Cook and Wall (1980). Permissions from the authors were obtained to use the survey questions at no monetary charge, provided that the research results would be shared with the authors upon completion of the dissertation. Other than the demographic questions, all the survey questions use 5-point or 7-point Likert scales. The survey has four major parts: introduction, the degree of virtuality of the work settings, transformational leadership behavior perceptions held by the virtual team members, and virtual team members’ interpersonal trust level and commitment level.

The first part of the E-leadership Survey is the introduction, which has 13 questions. Survey respondents were asked to evaluate one direct reporting manager or team leader who was not co-located in the same office as the respondent. The respondent was asked to picture one virtual leader, and only one, throughout the whole survey. Anonymity was guaranteed: The survey respondents did not leave their names for completing the survey, and the researcher did not know the names of the virtual leaders.
chosen for evaluation. A series of single choice questions guided the respondent to register some basic features of the virtual leader that the respondent was going to evaluate. The virtual leader being evaluated could be either male or female. The survey respondent was advised in this part that the survey would take about 15 to 20 minutes to complete, and the respondent could opt out of the survey at any time.

The second part of the E-leadership Survey has 12 questions and measures the degree of virtuality of the respondents’ virtual business environments. The questions in this part were adapted from Chudoba et al. (2005). The researchers identified three important constructs of the degree of virtuality: team distribution, workplace mobility, and variety of practices. Correlation and principal component factor analyses with Varimax rotation resulted in an index with 12 questions that have these three constructs with eigenvalues greater than 1.0. The factor analysis result and reliability measures were generally consistent. All three constructs had acceptable reliability measures ($\alpha = 0.85$ for team distribution; $\alpha = 0.70$ for workplace mobility; and $\alpha = 0.72$ for variety of practices). Team distribution, workplace mobility, and variety of practices have collinearity tolerance of 0.52, 0.67, and 0.69, respectively, demonstrating the discriminant validity of the three constructs of virtuality. External validity was verified by splitting the sample in half—one-half of the sample was used to repeat the exploratory factor analysis, and the other half was used to repeat the regression analysis. The split half results suggested that the construct structure of virtuality could be obtained with one sample of participants, and the 12 questions could be used to understand the team performance of another sample of participants. This substantiated the external validity of the virtuality index and its
constructs of team distribution, workplace mobility, variety of practices, and the scales measuring the constructs (Chudoba et al., 2005).

The third part of the E-leadership Survey assesses the independent variable, which is the perception of transformational leadership behaviors of the virtual leaders. This part has 24 questions, which are divided into four constructs based on the four “I”s: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. The 24 survey questions were selected from the 30 questions on transformational leadership behaviors from Cheung et al. (2001). For each construct of the transformational leadership behaviors, there are six questions. The overall fit of the regression model was assessed by checking the linearity and homoscedasticity of the residual, which was found satisfactory. Validation of the questions was performed by applying the regression model to the testing sample. In general, the prediction error was below 5% and was considered satisfactory (Cheung et al., 2001).

The fourth part of the E-leadership Survey has 21 questions and measures the dependent variables, which are virtual team members’ levels of interpersonal trust and organizational commitment. These questions were adapted from Cook and Wall’s (1980) research. Interpersonal trust at work was assessed using Cook and Wall’s 12-question scale. The instrument postulated four constructs of interpersonal trust at work: faith in intentions of management, faith in intentions of peers, confidence in actions of management, and confidence in actions of peers. Organizational commitment was assessed using Cook and Wall’s 9-question scale. The instrument assumed three constructs: organizational identification, organizational involvement, and organizational loyalty. The internal homogeneity data together with cross-validation and test-retest data
substantiated the claim that interpersonal trust and organizational commitment scales were psychometrically adequate, stable, and reliable (Cook & Wall, 1980).

Data Collection

The Tailored Design Method (Dillman, 2007) indicates that the more repeated contacts researchers have with those who are invited to take part in the survey, the higher the response rate will be. The entire data collection process took five weeks during the fourth quarter of 2016. To get sufficient sampling for this study, the following strategies were employed:

1. The researcher obtained the Institutional Review Board’s (IRB) approval for disseminating the online E-leadership Survey in 2016. Two days after the approval, the caucus group leader sent a short email notifying members that the survey was coming. The email specified that this was a voluntary survey.

2. One week after the first email notice was sent out, the caucus group leader sent out the survey invitation with the researcher’s introduction letter and the link to the online survey. This invitation was relatively short and emphasized how the findings were to be used to improve work environments at the company.

3. There was a window of three weeks for the survey to be open, and 10 days into that window, the caucus group leader sent a reminder thanking everyone who had already completed the survey and encouraging others to respond. The survey timeframe was extended for one extra week.
4. The first page of the survey informed the respondents of the benefits of the survey. The respondents consented to be part of the study by continuing the survey.

5. Five days before the close of the survey, there were still not enough complete and valid responses, so 250 individualized emails were sent out by the researcher to some caucus group members to remind them of the previous emails. More responses came in as the result of this effort.

A total of 206 responses were obtained, among which there were 123 complete and valid responses. Multiple linear regression analyses in SPSS were subsequently conducted to analyze the relationships between the independent variable (transformational leadership behaviors) and the dependent variables (interpersonal trust and organizational commitment), with the moderating variable being the degree of virtuality. Together the independent variable and moderating variable became predicting variables. The strength of the relationships between each predicting variable and the dependent variables, while controlling for the demographic information in the model, was tested. Other items tested included the relative strength of each construct of the predicting variables, as well as whether there were any interaction effects between the constructs of the predicting variables. To maintain a desired statistical power level of 0.8 and probability level of 0.05 for the multiple linear regression analysis, the sample size for this survey would need to be at least 118 complete and valid responses (S. Townsend, personal communication, April 18, 2016). Therefore, this study collected enough sampling for data analysis.
**Data Disposition**

The survey data will be kept on the Fisher server under Qualtrics and on the researcher’s personal hard drive for 3 years starting from the date of the successful defense of the dissertation. After the defense date, research results will be shared with the employee caucus group in aggregate. The researcher may continue or expand the current study using the same set of data during the three-year period. However, the data will not be shared with anybody else without the permission of St. John Fisher College’s Education Doctoral program or the dissertation committee. At the end of the three years, all data will be deleted from Qualtrics and the researcher’s personal records.

**Chapter Summary**

This chapter summarized the methodology for an e-leadership study. Existing survey questions with satisfactory validity and reliability were used in the E-leadership Survey. The E-leadership Survey was administered at a large Fortune 500 company in the northeastern part of the United States. The survey measured virtual team members’ perceptions of their e-leaders’ transformational leadership behaviors, the degree of virtuality of their work settings, and the levels of interpersonal trust and organizational commitment of the virtual team members. Anonymity of both the survey respondents and the virtual leaders assessed was guaranteed. Multiple regression analyses were run for the research model suggested in Figures 3.1 and 3.2. The results will be shared with the caucus group in aggregate after the completion and successful defense of the dissertation. Researchers who offered their instruments for this dissertation will also receive the research results, so the scholarly discussion about e-leadership can continue after the completion of this research.
Chapter 4: Results

Data Analysis

The e-leadership survey was disseminated to a total of 870 employees at a large multinational corporation headquartered in the northeastern United States in 2016. The survey received 206 responses, for an overall response rate of 23.6%. Of the 206 responses, 12.76% were employees who did not report to a virtual leader. Of those 87.34% who had virtual leaders, 95.83% of the respondents (172 in total) confirmed that they were assessing only one leader on one virtual team. Out of the 172 responses, 123 were complete and valid from respondents who had reported to one virtual manager or leader for more than one year. The number of responses exceeded the required number of 118 as specified in Chapter 3. Multiple linear regression analyses were subsequently conducted in the SPSS program on the 123 responses. Analyses of the data answered the three research questions.

1. The first research question is: “How do virtual team members’ perceptions of transformational leadership behaviors affect virtual team members’ level of interpersonal trust and organizational commitment?” The tests revealed whether the perceptions of transformational leadership behaviors overall significantly affected interpersonal trust and organizational commitment levels of the virtual team members.
2. The second research question is: “How does each construct of transformational leadership behaviors perceived by virtual team members contribute to virtual team members’ levels of interpersonal trust and organizational commitment?” Multiple regression analyses tested which construct (or constructs) of transformational leadership behaviors contributed to the interpersonal trust and organizational commitment of the virtual team members; and the results demonstrated the relative importance of the four constructs, also known as the four “I”s. Multiple regression analyses also determined what percentage of variances in the outcomes was accounted for by each of the four constructs of transformational leadership behaviors; this also answered the second research question.

3. Finally, the third research question is: “How does the degree of virtuality moderate the relationship between transformational leadership and outcomes such as interpersonal trust and organizational commitment within the context of virtual business environments?” The data revealed the moderating effects of the degree of virtuality and its three constructs.

**Demographic summary of the respondents.** Table 4.1 displays the distribution of demographic variables from the 123 complete and valid responses. The responses came from a total of six countries, with most respondents being female (79.7%), while the majority of their virtual leaders were male (56.9%). Only 7.3% of the respondents had a high school education, while the overwhelming majority had at least an undergraduate or higher levels of education. Most of the respondents (85.4%) were on a team for fewer
than 5 years, and over half (50.4\%) of the virtual leaders managed teams of fewer than 10 team members.

**Convergence and discriminant validity tests.** Before the multiple regression analyses were conducted, convergence and discriminant validity tests were conducted to locate those survey questions that were highly correlated. Some survey questions under transformational leadership behaviors and interpersonal trust were removed to avoid high collinearity equal to or above 0.70. Two second-order constructs—transformational leadership behaviors and interpersonal trust—had fewer Likert scale questions than before the convergence and discriminant validity tests. Table 4.2 and Table 4.3 display the final survey questions kept for these two second-order constructs. Out of the original 24 survey questions for transformational leadership behaviors, 10 were kept after highly correlated questions were removed. Out of the original 12 survey questions for interpersonal trust, six were kept after highly correlated questions were removed.

Since the survey questions under the degree of virtuality and organizational commitment were not highly correlated, these two second-order constructs—the degree of virtuality and organizational commitment—remained unchanged. Table 4.4 and Table 4.5 display the survey questions on Likert scales for organizational commitment and the degree of virtuality. They remained the same as before the convergence and discriminant validity tests. A principal component analysis was also conducted after the convergence and validity tests to verify that these four second-order constructs now had no highly-correlated questions, which confirmed the four major components of the research model. The four second-order constructs as displayed in the research model (see Figure 3.1) were now ready for further multiple regression analyses.
Table 4.1

*Frequency Distribution of Demographic Variables*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender of the respondent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>23</td>
<td>18.7%</td>
</tr>
<tr>
<td>Female</td>
<td>98</td>
<td>79.7%</td>
</tr>
<tr>
<td>Rather not disclose</td>
<td>2</td>
<td>1.6%</td>
</tr>
<tr>
<td>Countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>95</td>
<td>77.2%</td>
</tr>
<tr>
<td>Canada</td>
<td>17</td>
<td>13.8%</td>
</tr>
<tr>
<td>Europe (United Kingdom, France, &amp; Spain)</td>
<td>8</td>
<td>6.6%</td>
</tr>
<tr>
<td>Asia (Singapore)</td>
<td>3</td>
<td>2.4%</td>
</tr>
<tr>
<td>Gender of the virtual leader</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>70</td>
<td>56.9%</td>
</tr>
<tr>
<td>Female</td>
<td>53</td>
<td>43.1%</td>
</tr>
<tr>
<td>Levels of education of the respondents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>9</td>
<td>7.3%</td>
</tr>
<tr>
<td>Undergraduate level</td>
<td>47</td>
<td>38.2%</td>
</tr>
<tr>
<td>Graduate level</td>
<td>59</td>
<td>48.0%</td>
</tr>
<tr>
<td>Doctoral level</td>
<td>5</td>
<td>4.1%</td>
</tr>
<tr>
<td>Rather not disclose</td>
<td>3</td>
<td>2.4%</td>
</tr>
<tr>
<td>Years of working with this virtual leader</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5 years</td>
<td>105</td>
<td>85.4%</td>
</tr>
<tr>
<td>6-10 years</td>
<td>15</td>
<td>12.2%</td>
</tr>
<tr>
<td>11-15 years</td>
<td>1</td>
<td>0.8%</td>
</tr>
<tr>
<td>16 years or more</td>
<td>2</td>
<td>1.6%</td>
</tr>
<tr>
<td>How many people does this e-leader manage?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 10 team members</td>
<td>62</td>
<td>50.4%</td>
</tr>
<tr>
<td>10-50 members</td>
<td>49</td>
<td>39.8%</td>
</tr>
<tr>
<td>51 or more team members</td>
<td>10</td>
<td>8.1%</td>
</tr>
<tr>
<td>I don’t know</td>
<td>2</td>
<td>1.6%</td>
</tr>
</tbody>
</table>
Table 4.2

*New Survey Questions Forming the Independent Variable (transformational leadership behaviors)*

<table>
<thead>
<tr>
<th>Four constructs of transformational leadership</th>
<th>Survey questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFL_weight.1</td>
<td>Readily trust my judgment to overcome any obstacle.</td>
</tr>
<tr>
<td>TFL_weight.1i.1</td>
<td>Makes me feel good to be working with him or her.</td>
</tr>
<tr>
<td>TFL_weight.1i.2</td>
<td>Gives personal attention to members who seems being neglected.</td>
</tr>
<tr>
<td>TFL_weight.1i.3</td>
<td>Expresses his or her appreciation when I do a good job.</td>
</tr>
<tr>
<td>TFL_weight.1i.4</td>
<td>Is satisfied when the agreed standard of work is achieved.</td>
</tr>
<tr>
<td>TFL_weight.1i.5</td>
<td>Trusts project team members individually.</td>
</tr>
<tr>
<td>TFL_weight.1i.6</td>
<td>Gives ideas and forces me to rethink some of my own ideas which I had never questioned before.</td>
</tr>
<tr>
<td>TFL_weight.1i.7</td>
<td>Enables me to think about old problems in new ways.</td>
</tr>
<tr>
<td>TFL_weight.1i.8</td>
<td>Accepts me for what I am as long as I do my job.</td>
</tr>
<tr>
<td>TFL_weight.1i.9</td>
<td>Communicates high expectations, uses symbols to focus efforts, expresses important messages in simple ways.</td>
</tr>
</tbody>
</table>
Table 4.3

*New Survey Questions Forming the Dependent Variable 1 (interpersonal trust)*

<table>
<thead>
<tr>
<th>Four constructs of interpersonal trust</th>
<th>Survey questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faith in intentions of management.1</td>
<td>I feel quite confident that the group will always try to treat me fairly.</td>
</tr>
<tr>
<td>Faith in intentions of management.2</td>
<td>Our management would be quite prepared to gain advantage by deceiving the workers.</td>
</tr>
<tr>
<td>Confident in actions of Management</td>
<td>Our group has a poor future unless it can attract better leaders.</td>
</tr>
<tr>
<td>Faith in intentions of peers</td>
<td>I can trust the people I work with to lend me a hand if I need it.</td>
</tr>
<tr>
<td>Confidence in actions of peers.1</td>
<td>Most of my fellow workers would get along with their work if team and group leaders were not around.</td>
</tr>
<tr>
<td>Confidence in actions of peers.2</td>
<td>I can rely on other workers not to make my job more difficult by careless work.</td>
</tr>
</tbody>
</table>
Table 4.4

*Survey Questions Forming the Dependent Variable 2 (organizational commitment)*

<table>
<thead>
<tr>
<th>Three constructs of organizational commitment</th>
<th>Survey questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational identification.1</td>
<td>I am quite proud to be able to tell people who it is I work for.</td>
</tr>
<tr>
<td>Organizational identification.2</td>
<td>I feel myself to be part of the organization.</td>
</tr>
<tr>
<td>Organizational identification.3</td>
<td>I would not recommend a close friend to join our organization.</td>
</tr>
<tr>
<td>Organizational involvement.1</td>
<td>I am not willing to put myself out just to help the organization.</td>
</tr>
<tr>
<td>Organizational involvement.2</td>
<td>In my work I like to feel I am making some effort, not just for myself but for the organization as well.</td>
</tr>
<tr>
<td>Organizational involvement.3</td>
<td>To know that my own work had made a contribution to the good of the organization would please me.</td>
</tr>
<tr>
<td>Organizational loyalty.1</td>
<td>I sometimes feel like leaving this organization for good.</td>
</tr>
<tr>
<td>Organizational loyalty.2</td>
<td>Even if the organization was not doing well financially, I would be reluctant to change to another organization.</td>
</tr>
<tr>
<td>Organizational loyalty.3</td>
<td>The offer of a bit more money with another organization would not seriously make me think of changing my job.</td>
</tr>
</tbody>
</table>
Table 4.5

Survey Questions Forming the Moderating Variable (the degree of virtuality)

<table>
<thead>
<tr>
<th>Four constructs of the degree of virtuality</th>
<th>Survey questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team distribution.1</td>
<td>Collaborate with people in different time zones.</td>
</tr>
<tr>
<td>Team distribution.2</td>
<td>Work with people via Internet-based conferencing applications.</td>
</tr>
<tr>
<td>Team distribution.3</td>
<td>Collaborate with people you have never met face to face.</td>
</tr>
<tr>
<td>Team distribution.4</td>
<td>Collaborate with people who speak different native languages.</td>
</tr>
<tr>
<td>Workplace mobility.1</td>
<td>Work at different sites.</td>
</tr>
<tr>
<td>Workplace mobility.2</td>
<td>Have professional interactions with people outside the company.</td>
</tr>
<tr>
<td>Workplace mobility.3</td>
<td>Work with mobile devices.</td>
</tr>
<tr>
<td>Workplace mobility.4</td>
<td>Work at home during normal business days.</td>
</tr>
<tr>
<td>Workplace mobility.5</td>
<td>Work while traveling, e.g. at airports or hotels.</td>
</tr>
<tr>
<td>Variety of practices.1</td>
<td>Work on projects that have changing team members.</td>
</tr>
<tr>
<td>Variety of practices.2</td>
<td>Work with teams that have different ways to track their work.</td>
</tr>
<tr>
<td>Variety of practices.3</td>
<td>Work with people that use different collaboration technologies.</td>
</tr>
</tbody>
</table>
**Virtual business environment evaluation.** Descriptive data for the degree of virtuality and its three constructs are displayed in Table 4.6 and the histograms in Figure 4.1. The overall virtuality index is skewed highly toward high degrees of virtuality since its skewness is larger than 1 (SK = 1.218) as indicated in Table 4.6.

Team distribution was highly skewed toward high degrees of virtuality with the skewness larger than 1 (SK = 1.963) and kurtosis larger than 3 (Rku = 4.983). Data indicate that the virtual team members collaborated with people in different time zones and people who they never met face to face via Internet-based conferencing applications on a daily and weekly basis. However, team members collaborated with people who spoke different native languages less frequently (on a monthly, quarterly, or even longer basis).

Workplace mobility was highly skewed toward high degrees of virtuality with skewness larger than 1 (SK = 1.039). Virtual team members worked at different sites and with mobile devices on a daily and weekly basis, but they had fewer frequent professional interactions with people from outside the company or working time while traveling or at home during normal business days (on a monthly, quarterly, or even longer basis).

Variety of practices was moderately skewed toward high degrees of virtuality with skewness less than 1 (SK = 0.801). Other than working with teams that had different ways to track their work on a daily or weekly basis, team member replacement was less frequent. Team members also worked less frequently with people who used different collaboration technologies (on a monthly, quarterly, or even longer basis).
Table 4.6

Skewness and Kurtosis of the Degree of Virtuality

<table>
<thead>
<tr>
<th></th>
<th>DoV-Team Distribution</th>
<th>DoV-Workplace Mobility</th>
<th>DoV-Variety of Practices</th>
<th>Degree of Virtuality</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Valid</td>
<td>123</td>
<td>123</td>
<td>123</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Skewness</td>
<td></td>
<td>1.963</td>
<td>1.039</td>
<td>.801</td>
</tr>
<tr>
<td>Std. Error of Skewness</td>
<td></td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
</tr>
<tr>
<td>Kurtosis</td>
<td></td>
<td>4.983</td>
<td>1.242</td>
<td>-.097</td>
</tr>
<tr>
<td>Std. Error of Kurtosis</td>
<td></td>
<td>.433</td>
<td>.433</td>
<td>.433</td>
</tr>
</tbody>
</table>

Figure 4.1. The degree of virtuality and its three constructs.
Descriptive data for IV and DVs. Descriptive data for transformational leadership behaviors are in Table 4.7, and the histograms are in Figure 4.2. Survey respondents scored their virtual leaders highest on idealized influence behaviors. All means of the four constructs of transformational leadership were above 3, which indicated that survey respondents did recognize transformational leadership behaviors in their virtual leaders in general. Other than intellectual stimulation scores, which were almost a perfect normal distribution (SK = 0.000), all other three constructs and the overall transformational leadership scores were moderately skewed toward high scores as the negative skewness values fell between -½ and 0. In addition, the negative kurtosis values for all constructs indicated that there was still room for leadership improvement.

Table 4.7
Descriptive Statistics for Transformational Leadership Behaviors

<table>
<thead>
<tr>
<th></th>
<th>Idealized Influence</th>
<th>Individualized Consideration</th>
<th>Intellectual Stimulation</th>
<th>Inspirational Motivation</th>
<th>Transformational Leadership</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Valid</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>123</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>3.7154</td>
<td>3.6553</td>
<td>3.5854</td>
<td>3.3171</td>
</tr>
<tr>
<td>Std. Error of Mean</td>
<td></td>
<td>.09201</td>
<td>.07946</td>
<td>.06779</td>
<td>.09330</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td></td>
<td>1.02045</td>
<td>.88124</td>
<td>.75185</td>
<td>1.03478</td>
</tr>
<tr>
<td>Variance</td>
<td></td>
<td>1.041</td>
<td>.777</td>
<td>.565</td>
<td>1.071</td>
</tr>
<tr>
<td>Skewness</td>
<td></td>
<td>-.390</td>
<td>-.410</td>
<td>-.000</td>
<td>-.084</td>
</tr>
<tr>
<td>Std. Error of Skewness</td>
<td></td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
</tr>
<tr>
<td>Kurtosis</td>
<td></td>
<td>-.551</td>
<td>-.270</td>
<td>-.741</td>
<td>-.423</td>
</tr>
<tr>
<td>Std. Error of Kurtosis</td>
<td></td>
<td>.433</td>
<td>.433</td>
<td>.433</td>
<td>.433</td>
</tr>
<tr>
<td>Range</td>
<td></td>
<td>4.00</td>
<td>3.80</td>
<td>3.33</td>
<td>4.00</td>
</tr>
<tr>
<td>Minimum</td>
<td></td>
<td>1.00</td>
<td>1.20</td>
<td>1.67</td>
<td>1.00</td>
</tr>
<tr>
<td>Maximum</td>
<td></td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Sum</td>
<td></td>
<td>457.00</td>
<td>449.60</td>
<td>441.00</td>
<td>408.00</td>
</tr>
<tr>
<td>Percentiles</td>
<td></td>
<td>25</td>
<td>3.000</td>
<td>3.000</td>
<td>12.1333</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>4.0000</td>
<td>3.8000</td>
<td>14.1333</td>
<td>3.0000</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>5.0000</td>
<td>4.4000</td>
<td>16.6667</td>
<td>4.0000</td>
</tr>
</tbody>
</table>
Figure 4.2. The four constructs of transformational leadership.

Descriptive data for interpersonal trust are in Table 4.8, and the histograms are in Figure 4.3. These histograms indicate that faith in (the intentions of) peers was highly skewed toward high levels as absolute skewness was larger than 1 (SK = -1.453). Faith in (the intentions of) management and confidence in (the actions of) peers were moderately skewed toward high levels (SK = -0.982 and -0.973 respectively). Both the mean and the sum of confidence in (the intentions of) management were substantially lower than all other constructs, and confidence in (the actions of) management distribution was close to normal (SK = -0.117). Overall, interpersonal trust skewed moderately toward high levels (SK = -0.572) but had room for improvement, especially when confidence in (the actions of) management has a negative kurtosis value (Rku = -1.322).
Table 4.8

Descriptive Statistics for Interpersonal Trust

<table>
<thead>
<tr>
<th></th>
<th>Faith in Management</th>
<th>Faith in Peers</th>
<th>Confidence in Management</th>
<th>Confidence in Peers</th>
<th>Interpersonal trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Valid</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>123</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>10.9187</td>
<td>11.6748</td>
<td>8.4715</td>
<td>11.3415</td>
<td>42.4065</td>
</tr>
<tr>
<td>Std. Error of Mean</td>
<td>.26061</td>
<td>.26465</td>
<td>.37734</td>
<td>.22911</td>
<td>.84394</td>
</tr>
<tr>
<td>Median</td>
<td>12.0000</td>
<td>12.0000</td>
<td>8.0000</td>
<td>12.0000</td>
<td>44.0000</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>2.89033</td>
<td>2.93508</td>
<td>4.18492</td>
<td>2.54091</td>
<td>9.35970</td>
</tr>
<tr>
<td>Variance</td>
<td>8.354</td>
<td>8.615</td>
<td>17.514</td>
<td>6.456</td>
<td>87.604</td>
</tr>
<tr>
<td>Skewness</td>
<td>-.982</td>
<td>-1.453</td>
<td>-.117</td>
<td>-.973</td>
<td>-.572</td>
</tr>
<tr>
<td>Std. Error of Skewness</td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>.393</td>
<td>1.442</td>
<td>-1.322</td>
<td>.330</td>
<td>-.564</td>
</tr>
<tr>
<td>Std. Error of Kurtosis</td>
<td>.433</td>
<td>.433</td>
<td>.433</td>
<td>.433</td>
<td>.433</td>
</tr>
<tr>
<td>Sum</td>
<td>1343.00</td>
<td>1436.00</td>
<td>1042.00</td>
<td>1395.00</td>
<td>5216.00</td>
</tr>
</tbody>
</table>

Figure 4.3. The four constructs of interpersonal trust.
Descriptive data for organizational commitment are in Table 4.9, and the histograms are in Figure 4.4. Organizational identification and organizational involvement were moderately skewed toward high levels (SK = -0.300 and -0.959 respectively). However, survey respondents reported a variety of levels of organizational loyalty, which was moderately skewed toward low levels of commitment (SK = 0.280). In fact, more than half of the respondents expressed lack of organizational loyalty to their company. Both the mean and the sum of organizational loyalty were substantially lower than the two other constructs. Overall, the organizational commitment of the respondents skewed moderately toward low levels (SK = 0.265), and there was room for improvement for organizational identification and loyalty as their kurtosis values were negative.

Table 4.9

Descriptive Statistics for Organizational Commitment

<table>
<thead>
<tr>
<th></th>
<th>Organizational Identification</th>
<th>Organizational Involvement</th>
<th>Organizational Loyalty</th>
<th>Organizational Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>123</td>
</tr>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>15.0000</td>
<td>18.2520</td>
<td>11.4472</td>
<td>44.6992</td>
</tr>
<tr>
<td>Std. Error of Mean</td>
<td>.36744</td>
<td>.24039</td>
<td>.44115</td>
<td>.84062</td>
</tr>
<tr>
<td>Median</td>
<td>15.0000</td>
<td>19.0000</td>
<td>11.0000</td>
<td>44.0000</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>4.07511</td>
<td>2.66610</td>
<td>4.89262</td>
<td>9.32293</td>
</tr>
<tr>
<td>Variance</td>
<td>16.607</td>
<td>7.108</td>
<td>23.938</td>
<td>86.917</td>
</tr>
<tr>
<td>Skewness</td>
<td>-.300</td>
<td>-.959</td>
<td>.280</td>
<td>.265</td>
</tr>
<tr>
<td>Std. Error of Skewness</td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-.507</td>
<td>.372</td>
<td>-.649</td>
<td>-.401</td>
</tr>
<tr>
<td>Std. Error of Kurtosis</td>
<td>.433</td>
<td>.433</td>
<td>.433</td>
<td>.433</td>
</tr>
<tr>
<td>Range</td>
<td>17.00</td>
<td>12.00</td>
<td>18.00</td>
<td>40.00</td>
</tr>
<tr>
<td>Sum</td>
<td>1845.00</td>
<td>2245.00</td>
<td>1408.00</td>
<td>5498.00</td>
</tr>
</tbody>
</table>
Figure 4.4. The three constructs of organizational commitment.

**Multiple regression analyses part 1.** Multiple regression analyses were conducted using the newly confirmed second-order constructs and their composing constructs. Second-order construct transformational leadership behaviors and second-order construct the degree of virtuality had a statistically significant influence on interpersonal trust (see equation 1 in Table 4.10). Transformational leadership behaviors accounted for 40.8% of the changes in interpersonal trust, and leadership behaviors based on the degree of virtuality accounted for 2% (combined adjusted $R^2 = 42.8$). No moderating effect of the degree of virtuality in aggregate was detected during the multiple regression analysis leading to equation 1.
Table 4.10

**Equation ①**: \( \text{Interpersonal Trust} = 9.561 + 0.545 \times TFL + 0.120 \times DoV + \varepsilon \)

<table>
<thead>
<tr>
<th>Equation 1</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td></td>
<td>9.561</td>
<td>2.520</td>
</tr>
<tr>
<td>Transformational Leadership</td>
<td>.545</td>
<td>.059</td>
</tr>
<tr>
<td>Degree of Virtuality</td>
<td>.120</td>
<td>.053</td>
</tr>
</tbody>
</table>

*Note*. Dependent Variable: Interpersonal Trust

Second-order construct transformational leadership had a statistically significant influence on second-order construct organizational commitment regardless of second-order construct the degree of virtuality (see equation ② in Table 4.11). Transformational leadership behaviors accounted for 29.2% of the variances in organizational commitment (adjusted \( R^2 = 0.292 \)). No moderating effect of the degree of virtuality was detected during the multiple regression analysis leading to equation ②.

Table 4.11

**Equation ②**: \( \text{Organizational Commitment} = 21.045 + 0.656 \times TFL + \varepsilon \)

<table>
<thead>
<tr>
<th>Equation 2</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td></td>
<td>21.045</td>
<td>3.374</td>
</tr>
<tr>
<td>Transformational Leadership</td>
<td>.656</td>
<td>.091</td>
</tr>
</tbody>
</table>

*Note*. Dependent Variable: Organizational Commitment

When second-order construct transformational leadership behaviors was further broken down into its four constructs, or four “I”s, stepwise regression analysis enabled the most critical transformational leadership constructs affecting interpersonal trust to be established. Stepwise regression analysis showed that individualized consideration behaviors had a stronger relationship with interpersonal trust than other transformational
leadership constructs (see equation ③ in Table 4.12). The combined adjusted $R^2 = 0.493$
in equation ③, where individualized considerations accounted for 46.6% of the changes
in interpersonal trust and leadership behaviors based on variety of practices 2.7%.

Table 4.12

*Equation ③: Interpersonal Trust*

$$= 11.337 + 1.034 \times TFL\_IC + 0.278 \times \text{Variety of Practices} + \varepsilon$$

<table>
<thead>
<tr>
<th>Equation 3</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>11.337</td>
<td></td>
</tr>
<tr>
<td>Ind. Consideration</td>
<td>1.034</td>
<td>0.097</td>
</tr>
<tr>
<td>DoV-Variety of Practices</td>
<td>0.278</td>
<td>0.102</td>
</tr>
</tbody>
</table>

*Note.* Dependent Variable: Interpersonal Trust

Although no moderating effect of the degree of virtuality in aggregate was
detected, further analysis showed that variety of practices did have a moderating effect on
the relationship between individualized consideration behaviors of transformational
leadership and interpersonal trust as displayed in equation ④ in Table 4.13.

Individualized consideration behaviors accounted for 51.5% of the variances in
interpersonal trust with variety of practices as the moderator (adjusted $R^2 = 0.515$).

Table 4.13

*Equation ④: Interpersonal trust*

$$= 14.492 + 0.467 \times TFL\_IC + 7.191E^{-5} \times TFL\_X\_\text{Variety of Practices} + \varepsilon$$

<table>
<thead>
<tr>
<th>Equation 4</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>14.492</td>
<td></td>
</tr>
<tr>
<td>Ind. Consideration</td>
<td>0.467</td>
<td>0.047</td>
</tr>
<tr>
<td>TFLxVariety of Practices</td>
<td>7.191E-5</td>
<td>0.000</td>
</tr>
</tbody>
</table>

*Note.* Dependent Variable: Interpersonal Trust

85
Equations 3 and 4 revealed that individualized consideration behaviors might be the most important construct for transformational leadership within virtual business environments. To be specific, individualized consideration behaviors could lead to high levels of interpersonal trust of virtual team members. These equations also indicated that variety of practices could be both an independent variable and a moderating variable between individualized consideration behaviors and interpersonal trust of virtual team members.

When second-order construct transformational leadership was further broken down into its four constructs, or four “I”s, stepwise regression analysis enabled the most critical transformational leadership constructs affecting organizational commitment to be established. Stepwise regression analysis revealed that individualized consideration had a stronger relationship with organizational commitment than all other transformational leadership behaviors (see equation 5 in Table 4.14). Individualized consideration accounted for 30.5% of the variances in organizational commitment (adjusted R² = 0.305). No moderating effects of the virtuality index or its constructs were detected during the multiple regression analysis leading to equation 5.

Table 4.14

*Equation 5*: $\text{Organizational Commitment} = 23.154 + 1.179 \times TFL\_IC + \epsilon$

<table>
<thead>
<tr>
<th>Equation 5</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>23.154</td>
<td>3.002</td>
<td>7.712</td>
<td>.000</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>1.179</td>
<td>.160</td>
<td>.557</td>
<td>7.380</td>
</tr>
</tbody>
</table>

*Note.* Dependent Variable: Organizational Commitment
Multiple regression analyses part 2. For each construct of interpersonal trust and organizational commitment, transformational leadership constructs demonstrated different influences on the outcomes. Stepwise analysis eliminated those factors that were not important. Tables 4.15 to 4.21 explain the relationships. In Table 4.15, equation ⑥ indicates that both individualized consideration behaviors and behaviors based on the variety of practices were good independent variables for the faith in (the intentions of) management, which is a construct of interpersonal trust. Behaviors based on the variety of practices may include allowing team member replacement, giving the opportunities to work with teams that had different ways to track their work, or being open to using different collaboration technologies to accomplish team tasks. The combined adjusted $R^2 = 0.426$, where individualized consideration behaviors accounted for 38.5% of the variances in the faith in (the intentions of) management and leadership behaviors based on variety of practices account for 4.1%.

Table 4.15

<table>
<thead>
<tr>
<th>Equation 6</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.320</td>
<td>.919</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.410</td>
<td>.045</td>
</tr>
<tr>
<td>DoV-Variety of Practices</td>
<td>.146</td>
<td>.047</td>
</tr>
</tbody>
</table>

Note. Dependent Variable: Faith in Management

In Table 4.16, equation ⑦ indicates that individualized consideration behaviors as a construct of transformational leadership was a good independent variable for the faith in (the intentions of) peers, which is a construct of interpersonal trust. Individualized
consideration behaviors accounted for 26.3% of the variances in the faith in (the intentions of) peers (adjusted \(R^2 = 0.263\)).

Table 4.16

*Equation 7*: *Faith in Peers = 2.677 + 0.173 * TFL_IC + \(\varepsilon\)*

<table>
<thead>
<tr>
<th>Equation 7</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>2.677</td>
<td>.486</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.173</td>
<td>.026</td>
</tr>
</tbody>
</table>

*Note.* Dependent Variable: Faith in Peers

In Table 4.17, equation \(\circ8\) indicates that individualized consideration behaviors as a construct of transformational leadership was a good independent variable for confidence in (the actions of) management, which is a construct of interpersonal trust. Individualized consideration behaviors accounted for 39.8% of the variances in confidence in (the actions of) management (adjusted \(R^2 = 0.398\)). Equation \(\circ8\) also indicates that the overall level of confidence in (the actions of) management was low as the constant is a negative number. This matched the histogram of confidence in (the actions of) management in Figure 4.3, where the spread of confidence in (the actions of) management is very different from the other three constructs of interpersonal trust.

Table 4.17

*Equation 8*: *Confidence in Management = -1.273 + 0.301 * TFL_IC + \(\varepsilon\)*

<table>
<thead>
<tr>
<th>Equation 8</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-1.273</td>
<td>.627</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.301</td>
<td>.033</td>
</tr>
</tbody>
</table>

*Note.* Dependent Variable: Confidence in Management
In Table 4.18, equation (9) indicates that individualized consideration behaviors as a construct of transformational leadership was a good independent variable for confidence in (the actions of) peers, which is a construct of interpersonal trust. Intellectual stimulation behaviors, also a construct of transformational leadership, however, was a good independent variable for negative influences. The combined adjusted R^2 = 0.097, where individualized consideration behaviors accounted for 5.9% of the positive changes in confidence in (the actions of) peers and intellectual stimulation behaviors accounted for 3.8% of the negative changes in confidence in (the actions of) peers. This explained why individualized consideration alone accounted for more variances in interpersonal trust and organizational commitment than transformational leadership did in aggregate.

Table 4.18

*Equation (9): Confidence in Peers* = 9.975 + 0.284 *TFL_IC* – 0.355 TFL_IS + ε

<table>
<thead>
<tr>
<th>Equation 9</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>9.975</td>
<td>1.084</td>
<td>9.204</td>
<td>.000</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.284</td>
<td>.074</td>
<td>.492</td>
<td>3.845</td>
</tr>
<tr>
<td>Intellectual Stimulation</td>
<td>-.355</td>
<td>.144</td>
<td>-.315</td>
<td>-2.463</td>
</tr>
</tbody>
</table>

*Note.* Dependent Variable: Confidence in Peers

In Table 4.19, equation (10) indicates that individualized consideration behaviors as a construct of transformational leadership was a good independent variable for organizational identification, which is a construct of organizational commitment. Individualized consideration behaviors accounted for 38.4% of the changes in organizational identification (adjusted R^2 = 0.384).
Table 4.19

*Equation* (10): *Organizational Identification* = 4.460 + 0.577 * TFL_IC + \( \varepsilon \)

<table>
<thead>
<tr>
<th>Equation 10</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>4.460</td>
<td>1.235</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.577</td>
<td>.066</td>
</tr>
</tbody>
</table>

*Note*. Dependent Variable: Organizational Identification

In Table 4.20, *equation 11* indicates that individualized consideration behaviors as a construct of transformational leadership was a good independent variable for organizational loyalty, which is a construct of organizational commitment. Individualized consideration behaviors accounted for 17.8% of the changes in organizational loyalty (adjusted \( R^2 = 0.178 \)).

Table 4.20

*Equation* (11): *Organizational Loyalty* = 2.730 + 0.477 * TFL_IC + \( \varepsilon \)

<table>
<thead>
<tr>
<th>Equation 11</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>2.730</td>
<td>1.713</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.477</td>
<td>.091</td>
</tr>
</tbody>
</table>

*Note*. Dependent Variable: Organizational Loyalty

In Table 4.21, *equation 12* indicates that individualized consideration behaviors as a construct of transformational leadership was a good independent variable for organizational involvement, which is a construct of organizational commitment. Individualized consideration behaviors accounted for 3.5% of the variances in organizational involvement (adjusted \( R^2 = 0.035 \)).
Table 4.21

Equation (12): Organizational Involvement = 15.965 + 0.125 * TFL_IC + ε

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>15.965</td>
<td></td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.125</td>
<td>.207</td>
</tr>
</tbody>
</table>

Note. Dependent Variable: Organizational Involvement

Hypotheses Testing

Perceived transformational leadership behaviors within virtual business environments were positively related to interpersonal trust of virtual team members as evidenced by equation (1), so H1a was supported. Idealized influence and inspirational motivation behaviors of virtual leaders were eliminated in the stepwise analyses as unimportant factors; therefore, H1a-1 and H1a-2 were not supported. Individualized consideration behaviors of virtual leaders were found to have a positive impact on interpersonal trust as evidenced in equation (6), (7), (8), and (9); therefore, H1a-3 was supported. Intellectual stimulation behaviors of virtual leaders were found to be negatively influencing interpersonal trust as evidenced in equation (9); therefore, H1a-4 was not supported. No moderating effect of the degree of virtuality in aggregate was detected on the relationship between transformational leadership behaviors and interpersonal trust. However, a positive moderating effect of variety of practices on such a relationship was detected as evidenced in equation (4), which supports H2a-3. Since variety of practices is a construct of the degree of virtuality, H2a was partially supported. At the meantime, stepwise analysis eliminated the other two constructs of the virtuality index; therefore, H2a-1 and H2a-2 were not supported.
Perceived transformational leadership behaviors within virtual business environments were positively related to organizational commitment of virtual team members as evidenced by equation \( \odot \), so H1b was supported. Idealized influence, intellectual stimulation, and inspirational motivation behaviors as perceived of virtual leaders were eliminated in the stepwise analyses as unimportant factors; therefore, H1b-1, H1b-2, and H1b-4 were not supported. Individualized consideration behaviors of virtual leaders were found to have a positive impact on organizational commitment as evidenced in equations \( \odot \), \( \odot \), and \( \odot \); therefore, H1b-3 was supported. No moderating effect of the degree of virtuality was detected on the relationship between transformational leadership behaviors and organizational commitment; therefore, H2b, including H2b-1, H2b-2, and H2b-3, was not supported (see equations \( \odot \) and \( \odot \)). Based on these results, the three research questions can be answered as such:

1. Perceptions of transformational leadership behaviors in aggregate had a statistically significant positive influence on both virtual team members’ interpersonal trust and organizational commitment. Transformational leadership behaviors accounted for 40.8% of the variances in interpersonal trust and 29.2% of the variances in organizational commitment.

2. The four “I”s of transformational leadership behaviors contributed differently to virtual team members’ levels of interpersonal trust and organizational commitment. To be more specific:
   a. Individualized consideration had a statistically significant positive influence on all four constructs of interpersonal trust and three constructs of organizational commitment (see equations \( \odot \)-\( \odot \)).
b. Intellectual stimulation had a statistically significant negative influence on the confidence in the actions of peers, which is a construct of interpersonal trust (see equation ③).

c. Intellectual stimulation had no statistically significant influence on organizational commitment. Idealized influence and inspirational motivation had no statistically significant influence on both dependent variables.

3. Of the 206 responses received for the e-leadership survey, a majority (87.34%) of the respondents worked with some degrees of virtuality. Although the degree of virtuality in aggregate had no statistically significant moderating effect on the relationships between transformational leadership behaviors and interpersonal trust and organizational commitment, further analysis revealed that a construct of the degree of virtuality—variety of practices—had a positive influence on interpersonal trust (see equation ③); in particular, it positively influenced the faith in the intentions of management, which is a construct of interpersonal trust (see equation ③). In addition, it had a statistically slight moderating effect on the relationship between transformational leadership behaviors and interpersonal trust (see equation ④).

Chapter Summary

This chapter presented the results from the multiple regression analyses conducted on data collected using the instrument specified in Chapter 3. Data analysis presented the demographic summary of the survey respondents and evaluation of the virtual business
environments at a northeastern corporation in the United States. Convergence and discriminant validity tests were subsequently conducted, and highly correlated survey questions were removed from the independent variable and one dependent variable before multiple regression analyses were conducted. Descriptive data for the independent, moderating, and dependent variables were presented. Multiple regression analyses generated 12 equations. The summary of hypotheses testing and answers to the research questions were presented based on these equations.
Chapter 5: Discussion

This paper presented a quantitative study of e-leadership. The purpose of this study was to examine the relationships between perceived transformational leadership behaviors and virtual team members’ interpersonal trust and organizational commitment. The study also explored the moderating effects of the degree of virtuality on these relationships. Data analyses answered the three research questions and 12 hypotheses laid out in Chapter 3. The contributions of this study to the field of e-leadership are threefold:

1. Transformational leadership behaviors in aggregate were confirmed to contribute to higher interpersonal trust and organizational commitment levels within virtual business environments.

2. The is the first study to analyze different transformational leadership behavior constructs, and the results revealed how each construct contributed to interpersonal trust and organizational commitment levels within virtual business environments. Findings indicated that not all constructs of traditional transformational leadership were important within virtual business environments.

3. This study is one of the first to examine the functions of the degree of virtuality on the relationship between leadership behaviors and outcomes within virtual business environments. Although the degree of virtuality in aggregate did not moderate the dynamics between transformational leadership behaviors and virtual team members’ interpersonal trust and organizational
commitment, variety of practices—a construct of the degree of virtuality—did have a moderating effect on the relationship between transformational leadership behaviors and interpersonal trust.

**Implications of Findings**

**Four “I”s of transformational leadership.** This study is the first to break the transformational leadership behaviors into the four “I”s and study their contributions to the two outcomes separately within virtual business environments. The findings about the four “I”s also addressed the research gap identified by Eseryel and Eseryel (2013). In their study, they proposed that future studies should try to get a better understanding of how transformational leadership operated in teams. The E-leadership Survey was conducted for this current study in a corporation in the northeastern United States. The overall score of transformational leadership perceived by the survey respondents confirmed that virtual leaders at this company did demonstrate transformational leadership. The survey results also revealed that transformational leadership behaviors in aggregate did contribute significantly to the virtual team members’ interpersonal trust and organizational commitment.

This study has also confirmed that not all transformational leadership behaviors contributed equally: One “I” (individualized consideration) out of the four worked particularly well within virtual business environments; another “I” (intellectual stimulation) had a statistically significant negative influence on interpersonal trust; and two other “I”s (idealized influence and inspirational motivation) did not have any statistically significant impact on both dependent variables. This could be because the virtual teams or organizations might have already hired those who were most suitable for
the work they did; therefore, intellectual stimulation—which could be perceived as distrust and cause conflict—was counterproductive. To be more specific, intellectual stimulation behaviors perceived by the virtual team members would affect team members’ confidence in the actions of peers. This means that there would be less trust among virtual team members if virtual leaders exhibited behaviors perceived as intellectually stimulating. Researchers (Kanawattanachai & Yoo, 2007) suggest that early and frequent task-oriented communications from virtual leaders play a critical role in forming the initial beliefs and trust of team members. Once teams are formed, improving virtual communication has a significant negative effect on the trust dimension (Politis, 2014), and the current study’s findings partially match Politis’s observation.

Other than this reason for the negative impact from intellectual stimulation, there could be another explanation. The virtual leader may not be effective at being intellectually stimulating, hence the counter-productivity. While the e-leaders graded by the survey respondents might have tried their best, their leadership style may have seemed unnatural due to the constraints of computer-mediated communication. Most of the leaders today are between the age of 45 and 65. They are generally considered less savvy in technology and virtual communication than their younger followers, or virtual team members. Therefore, the perceptions of intellectual stimulation were more negative than expected. This can be partially supported by the close-to-normal distribution of the scores of intellectual stimulation behaviors: The virtual leaders evaluated were not particularly good at intellectual stimulation behaviors as compared to other transformational leadership behaviors.
Furthermore, data analyses also revealed that two other constructs (idealized influence and inspirational motivation) did not have any statistically significant influence on the outcomes. Virtual leaders should pay special attention to these findings because behaviors that could normally exert idealized influence and inspirational motivation within a traditional business environment may not necessarily increase trust and commitment within a virtual environment. This might be because virtual team members were already highly motivated by the empowerment and independence they had due to the nature of virtual business environments. In such environments, virtual team members have relatively more freedom in deciding how their jobs were carried out than in traditional business environments. Hence, there would be no need for deliberate idealized influence and inspirational motivation from virtual leaders.

This might also have something to do with the high levels of education of the survey respondents. Researchers (Fausing et al., 2015; Li et al., 2013) believed that the relationship between transformational leadership behaviors and team members’ behavioral outcomes is contingent on various team member perceptions and characteristics. Since more than half of the survey respondents (52.1%) had earned a master’s or doctoral degree, their receptivity of transformational leadership behaviors could be heavily influenced by their perceptions of their contributions and their virtual leaders’ intentions to influence and motivate. Future research could investigate how transformational leadership behaviors are perceived by teams with different educational backgrounds (that is, more participants with high school level education and fewer participants with master’s or doctoral level education), especially within virtual business environments.
environments. This may be a good research direction to compare the impacts of transformational leadership in traditional and virtual business environments as well.

Although the virtual leaders were scored the highest on idealized influence, individualized consideration was the only construct that positively affected virtual team members’ interpersonal trust and organizational commitment levels. Individualized consideration is comparable to “enable others to act and encourage the heart” as defined by Kouzes and Posner (2012). Virtual leaders could enable and encourage team members by listening to their needs and concerns, ensuring fair workload distribution, expressing words of thanks or praise as a means of motivation, making public recognition of achievements and initiatives, making private notes of congratulations to boost self-confidence, and undertaking individualized career counseling and mentoring.

Virtual leaders could, therefore, refine their leadership behaviors in only two dimensions of transformational leadership behaviors, which are to provide the best individualized considerations and optimize intellectual stimulation for their virtual team members. This matches Li et al.’s (2013) finding that virtual leaders need to tailor their transformational actions based on contingent aspects rather than to use a one-size-fits-all, group directed, transformational style. Different skills and techniques need to be acquired for virtual business environments as compared to those from traditional business environments to address team members’ professional and personal needs. Meanwhile, intellectual stimulation techniques need to be cautiously implemented, curtailed, or eliminated. Furthermore, virtual leaders need to adapt to the challenges of virtual business environments; time and resources traditionally allocated for idealized influence and inspirational motivation can be utilized better for learning technical skills, enhancing
leaders’ virtual competence, and increasing social and cultural awareness (Samartinho et al., 2014). Strategizing the best virtual team structure that aligns with business needs would lead to the optimal team performance and highest levels of interpersonal trust and organizational commitment.

These results about the four “I”s of transformational leadership behaviors partially confirmed the findings from Whitford and Moss (2009) that the utility of transformational leadership is better demonstrated in traditional environments than virtual environments. Since only one construct out of the four transformational leadership behaviors promoted interpersonal trust and organizational commitment, and one construct even demoted interpersonal trust within virtual business environments, it would be intuitive to think that transformational leadership behaviors would lead to better outcomes in traditional environments where all four constructs could promote the results. Since this study is one of the first to research closely the effects of each of the four constructs of transformational leadership behaviors on team outcomes within virtual business environments, such a conclusion is subject to further testing.

The degree of virtuality. Previously, Kirkman and Mathieu (2005) and Phelps (2014) proposed research on the function of the degree of virtuality. The finding in this current study is that there was no moderating effect of the degree of virtuality in aggregate on the relationships between transformational leadership and interpersonal trust and organizational commitment, which was not anticipated by the researcher. The finding is not consistent with some previous findings, such as from Cramton and Webber (1999), Gibson and Cohen (2002), Kennedy et al. (2010), Lu et al. (2006), Peñarroja et al. (2013), Purvanova and Bono (2009), and Webster and Wong (2008). The three most recent
exemplary studies that were reviewed conducted research on transformational leadership and the degree of virtuality within the past 10 years: Peñarroja et al. (2013), Purvanova and Bono (2009), and Webster and Wong (2008). Webster and Wong’s research, the earliest of these three studies, led to findings that team members with high degrees of virtuality experienced more satisfaction than those teams with lesser degrees of virtuality. The researchers believed that the degree of virtuality could be important to team functioning; therefore, they suggested future research should be done to explore the functions of the degree virtuality. Their study was conducted in a large, global, and high-tech organization by sending out an online survey, same as this current study. Similar to Webster and Wong (2008), O’Leary and Cummings (2007) also thought different degrees of virtuality may lead to different kinds of dynamics for virtual teams. Meanwhile, the other two most recent studies came up with two different findings.

Peñarroja et al.’s (2013) research indicated that high virtuality levels negatively affected team trust, probably because computer-mediated communication was less efficient in transmitting rich information, requiring a longer period of time to reach the same degree of information richness than face-to-face communication. This study was conducted in an experimental situation with participants from a university in Spain, and the researchers did suggest caution when generalizing the results. Purvanova and Bono’s (2009) findings contradicted Peñarroja et al.’s in that transformational leadership had a stronger effect in teams with high degrees of virtuality. According to Purvanova and Bono (2009), the effect of transformational leadership behaviors increased as the degrees of virtuality increased. Similar to Peñarroja et al.’s study, Purvanova and Bono conducted
their research with undergraduate students, where the duration of the tests was limited and the experiences of both the student participants and the virtual leaders were limited.

Based on the above mentioned exemplary studies and the research gaps identified by these studies, the current study started with the assumption that the degree of virtuality could affect the relationships between transformational leadership and interpersonal trust and organizational commitment. However, the finding about the degree of virtuality from this current study is different from all three exemplary studies mentioned above. The configuration of virtual teams might have played a role here. In those three studies, virtuality of the environment was designed in three types only: face-to-face, semi-virtual, and completely virtual. There was no single continuous spectrum of virtuality in these studies; in this current study, however, virtuality was measured on more dimensions and on a continuous scale. This was made possible by Lu et al.’s (2006) study, which is formative for e-leadership research. They provided 12 questions on Likert scales and three independent yet interrelated constructs for the degree of virtuality. The measurements are comprehensive, reliable, and valid. Hence, several studies including Politis (2014) suggested using Lu et al.’s scale to measure the degree of virtuality. The current study was also the first to dissect the degree of virtuality and test each of its constructs and their moderating and predicting effects on the outcomes. Furthermore, this study was conducted in a global service organization during a time when video conferencing and other visual aid technologies were much more accessible than just 3 or 4 years before. These could be the reasons why the finding about the degree of virtuality from this current study is different from the three exemplary studies.
When the degree of virtuality was further dissected into three constructs, one of the constructs—variety of practices—was found to have a moderating effect on the relationship between transformational leadership behaviors and interpersonal trust. This matched the findings from Lu et al. (2006) that variations in practices interfered with the perception of trust, team communications, work coordination, and timely completion of projects. To be more specific, it was the variety of practices that exerted this positive influence on the faith in the intentions of management, one of the four constructs of interpersonal trust. In addition, Lu et al. did not find any relationship between team distribution and team performance, including mutual trust among team members, which matches the findings from this study. In terms of workplace mobility, Lu et al. found it had a negative impact on communication effectiveness. But in the current study, workplace mobility did not affect the outcomes. This could be due to the wider availability of video conferencing and other visual aid technologies than when Lu et al. conducted their study.

The fact that team distribution and workplace mobility did not affect interpersonal trust and organizational commitment in this study might be because remote work and virtual environments have been de-mystified over the past couple of decades. Since e-leadership became a subject for study at the turn of the century, more and more corporations have realized and capitalized on the benefits of using virtual resources. Indeed, technologies have advanced to such a degree that users have less uneasiness while working remotely than when George and Sleeth (2000) were studying virtual business environments. Broadband connections have bridged gaps among remote team members, who may experience less isolation and more connectedness. Technology has
helped virtual team members overcome pitfalls of cue-deprivation, physical distance, and diversity (Bassanino et al., 2014; Windeler et al., 2015).

On the other hand, a growing variety of practices should increase team members’ faith in the intentions of management; therefore, it can boost virtual team members’ overall interpersonal trust. This might seem counterintuitive at first, but trusting virtual team members to try out different ways of completing their job requirements and use different collaboration technologies can raise team members’ self-confidence. New team members can also bring fresh perspectives. This, in turn, can improve interpersonal trust. This also matches the findings from Lu et al. (2006) that variety of practices is the most influential construct of the degree of virtuality.

Other findings from this research. More findings related to the team members’ level of education, country of work, and team size, as well as team members’ and e-leaders’ gender and age range were disclosed by the analyses. Table 5.1 indicates that virtual team members’ levels of education had a statistically significant negative influence on the confidence in the actions of peers, which is a construct of interpersonal trust. An overall of 92.7% of the survey respondents had an undergraduate degree or higher education including more than half had earned a master’s degree or doctoral degree. Respondents’ high level of self-confidence and motivation could be the main reason why team members did not need intellectual stimulation. The same survey might have a different result were it to be conducted in a setting where high levels of education are less concentrated. Virtual team members’ age had a statistically significant positive influence on interpersonal trust; the older the virtual team members were, the more confidence they had in the actions of their peers. Education level and age range together
accounted for 5.3% of the changes in the confidence in the actions of peers. This could help leaders predict a virtual team member’s attitude toward peers around them.

Table 5.1

*Coefficients for Confidence in Peers*

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>9.905</td>
<td>1.543</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.266</td>
<td>.072</td>
</tr>
<tr>
<td>Intellectual Stimulation</td>
<td>-315</td>
<td>.141</td>
</tr>
<tr>
<td>What is your highest level of education?</td>
<td>-.665</td>
<td>.270</td>
</tr>
<tr>
<td>What is your age range?</td>
<td>.480</td>
<td>.232</td>
</tr>
</tbody>
</table>

*Note. Dependent Variable: Confidence in Peers*

Likewise, as indicated in Table 5.2, the higher the level of education was, the lower the organizational commitment. In addition, female virtual team members had lower organizational commitment than their male counterparts. Together, levels of education and respondents’ age range accounted for 5.2% of the variances in the confidence in the actions of peers. Virtual leaders, therefore, need to pay attention to the individual characteristics of their team members, determine their communication strategies with each member, and provide work-life balance to virtual team members of different genders.

Table 5.3 indicates that virtual team members residing in the United States tended to have less organizational loyalty than their peers in Europe (such as the United Kingdom, Spain, and France), Canada, and Singapore; the American culture of individualism likely plays a big role in this phenomenon. In addition, the older the team members were, the more organizational loyalty they had. The combination of the country
of work and age range accounted for 5.3% of the changes in organizational loyalty. A similar study can be conducted within different cultural contexts in the future to test what cultural elements affect outcomes such as interpersonal trust and organizational commitment.

Table 5.2

*Coefficients for Organizational Loyalty*

<table>
<thead>
<tr>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>(Constant)</td>
<td>9.753</td>
</tr>
<tr>
<td>Individualized Consideration</td>
<td>.460</td>
</tr>
<tr>
<td>What is your highest level of education?</td>
<td>-1.228</td>
</tr>
<tr>
<td>Please specify your gender.</td>
<td>-1.951</td>
</tr>
</tbody>
</table>

*Note.* Dependent Variable: Organizational Loyalty

Table 5.3

*Coefficients for Organizational Commitment*

<table>
<thead>
<tr>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>(Constant)</td>
<td>18.746</td>
</tr>
<tr>
<td>Transformational Leadership</td>
<td>.635</td>
</tr>
<tr>
<td>What is your age range?</td>
<td>2.415</td>
</tr>
<tr>
<td>List of Countries</td>
<td>-.033</td>
</tr>
</tbody>
</table>

*Note.* Dependent Variable: Organizational Commitment

Gender of the virtual leaders had no statistically significant correlation with their perceived transformational leadership behaviors and did not affect the outcomes either. This is contrary to what has been suggested in some literature, such as Hoyt and Blascovich (2003), that female leaders were more often associated with transformational leadership than male leaders. Therefore, this has implications on how corporate
leadership may develop and train future leaders. Since gender may not matter, those who demonstrate the most effective leadership behaviors will be the best candidates for e-leadership positions.

The duration of team members’ tenure with one particular virtual leader was not found to have statistically a significant impact on the outcomes. In this study, 85.4% of the survey respondents worked with one particular leader for less than 5 years. Team size was not found to have statistically a significant impact on interpersonal trust and organizational commitment either. These findings have implications on virtual businesses’ hiring practices. Virtual team leaders should not be constrained by factors such as tenure of the team members and team size. Rotating new virtual team members often and hiring only those who are experienced should help achieve the team goals faster without affecting interpersonal trust and organizational commitment.

Practical Implications

Transformational e-leadership. Based on the findings about transformational leadership behaviors within virtual business environments and the degree of virtuality, the research models can be modified as displayed in Figures 5.1 and 5.2. Figure 5.1 displays the modified research model for interpersonal trust and Figure 5.2 displays the modified research model for organizational commitment, both based on Figure 3.1. Although no moderating variable was discovered for organizational commitment, according to equations ○ and ○, variety of practices can be a good independent variable for interpersonal trust; meanwhile, according to equation ○, variety of practices was also a moderator between transformational leadership behaviors and interpersonal trust. This indicates that the leadership behaviors that were based on variety of practices acted as an
independent variable, and the structural elements of variety of practices acted as a moderating variable. This further confirms the two roles of information and communication technology: an enabling role and a supporting role (Nilan & Mundkur, 2007; Romano Jr. et al., 2010). As an independent variable, leadership behaviors based on variety of practices—such as allowing team member replacement and the opportunities to work with teams that had different ways to track their work—enabled the outcomes. As a moderating variable, structural elements of variety of practices—such as technical support that allowed different ways to track work and collaboration technologies that bridged temporal distances—also served as a supporting mechanism for leadership behaviors to be effective.

Figure 5.1. Modified research model for interpersonal trust.

Figure 5.2. Modified research model for organizational commitment.
Similar to Whitford and Moss (2009), Purvanova and Bono (2009) also suggested that they observed fewer behaviors of the four “I”s in virtual teams. A possible interpretation of the findings about the four “I”s of transformational leadership behaviors within virtual business environments and the degree of virtuality could be that there is a different type of transformational leadership. Given the significant difference of composition of transformational leadership across traditional and virtual environments, the researcher suggests that transformational leadership behaviors within virtual business environments should be called by a different term to stress the different constructs within the second order e-leadership construct leading to the outcomes, such as interpersonal trust and organizational commitment. Since the differences have a lot to do with the virtuality of the business environments, such leadership behaviors can be called transformational e-leadership behaviors. Transformational e-leadership can be defined as a leadership approach that creates significant changes in individuals and organizations within virtual business environments.

Becoming virtual and doing business in virtual environments are corporate strategies, not simply a matter of organizational structure (Venkatraman & Henderson, 1998). It is imperative for virtual leaders and managers to understand and practice effective leadership behaviors within virtual business environments. Based on the above findings, a recommended research model for transformational e-leadership is displayed in Figure 5.3 (which is based on Figure 3.2). Aside from verifying that individualized consideration is a critical component of transformational e-leadership, future research can focus on identifying behaviors that can reverse the negative influence of intellectual stimulation or replace the behaviors of such, so virtual leaders know how best to motivate
virtual team members. Research is also needed to further verify whether idealized influence and inspirational motivation indeed do not play an important role in virtual business environments, and if not, why. Future studies could identify those behaviors that are associated with the variety of practices and examine how they fit into the model of transformational e-leadership, both as an independent variable and moderating variable.

The blank ovals in Figure 5.3 represent behaviors or factors that are currently not identified but could potentially be an important part of transformational e-leadership, or the moderators that affect its impact on the outcomes. Behaviors or factors may include special skills and characteristics suggested in Samartinho et al.’s (2014) model of e-leadership (see Figure 2.1), such as operational coordination, virtual leaders’ technical competence, and social or cultural awareness. Alistoun and Upfold (2012), Krum et al. (2013), and Savolainen (2013) deemed it important to develop e-leaders’ trust-building skills; therefore, training and education—another critical component in Figure 2.1—can be included as well.

Further consideration should be given to organizational commitment. Since no moderating variables were identified for Figure 5.2, it would be interesting to identify moderating variables that can affect the relationship between transformational e-leadership behaviors and organizational commitment. Organizations’ successes depend heavily on committed virtual team members (Brooks, 2002; Jassawalla & Sashittal, 2003; Mcelroy, 2001). High turnover rates in virtual teams have been a serious managerial issue; MyWorklife (2013) reported an attrition rate of over 20% for the information technology outsourcing industry, and Towers Watson (2013) reported a 19% staff turnover rate for business process outsource companies. As indicated in Table 4.9 and
Figure 4.4, the company surveyed for this study had low levels of overall organizational commitment. While respondents scored high on organizational involvement, there was definitely room for improvement for organizational identification and organizational loyalty. Less than ideal organizational commitment was also reflected by the short tenure of the survey respondents. Over 85% of the respondents were with their team for less than 5 years. Although short tenure might not impact interpersonal trust and organizational commitment, unexpected turn-over and training costs could still have a negative impact on the financial performances of the organizations. Virtual leaders need to know how to best exploit the advantages or overcome the disadvantages of the business environments to generate the most commitment from virtual team members.

![Diagram](image)

*Figure 5.3. Recommended future research model for transformational e-leadership.*
**E-leadership practices and social justice.** There is theoretical and practical significance to this research work. Thorough understanding of the differences between traditional business environments and virtual business environments can help virtual leaders adjust their skills for effective leadership. The findings from this study match those from Al-Ani et al. (2011) that upper management might not distinguish between co-located and distributed teams, as the degree of virtuality in aggregate did not matter. This might suggest that traditional leadership theories and practices can be applied to virtual business settings, with appropriate modifications to how messages are delivered and performance results are measured. According to Kerfoot (2010), challenges of virtual leadership were the same as traditional leadership, but occurred in a much different venue where direct supervision and interaction were impossible. That means virtual leaders should educate themselves well on the usage of advanced information technology to achieve high productivity. They also need to adjust to the asynchronous communication environments, synergizing dispersed teams with less salient work identities but heightened needs for self-regulation.

Virtual leaders can be trained to successfully influence team members while relying on computer-mediated communication, building trust, shortening subjective distance, sharing information, processing gains and losses, dealing with feelings of isolation, encouraging participation, and enhancing coordination and cohesion (Alistoun & Upfold, 2012). Training models and practical tools can be devised from the research results in the future. For instance, virtual organizations can develop training models for communication with electronic media, clarification of goals and roles, development of individualized consideration associated with various virtual work dynamics, guidelines
for sharing socio-emotional contents and virtual environment etiquette, development of intra-team processes and virtual team building activities, conflict management for virtual teams, as well as suggestions on how to avoid drawbacks of computer-mediated communication, such as information overload.

Information and communication technology has revolutionized how society communicates, how people collaborate, and how leaders lead. Virtual workplaces have transformed the traditional business mindset, and “it is clear that they are here to stay” (Lepsinger & DeRosa, 2015, p. 6). Information and communication technology has institutionalized many practices over the past three decades. Leadership practices have quickly embraced virtual connections in addition to in-person communications. Leaders need to know how to take advantage of technologies and exert their leadership influence through technologies. Other than particular skills e-leaders need to master, corporations and organizations should expand their leadership horizon and look into the three levels suggested by Avolio et al. (2014) and Boughzala et al. (2013). The three levels are micro-level (individuals and dyads), meso-level (groups and teams), and macro-level (organizations and contexts). On the micro level, e-leaders need to be aware of the cognitive barriers and know how to deal with perceived unfairness for individual virtual members. For instance, those who work remotely might feel neglected when comparing themselves with those who have physical access to their virtual leaders.

As evidenced in this study, virtual team members did not have high levels of confidence in the actions of management (Figure 4.3) and organizational loyalty (Figure 4.4). Future research can study whether that was due to individual leaders’ behaviors or originated from the organizational structure on the meso-level. It is worth studying the
right balance of virtual practices and traditional interactions for virtual leaders and team
members in order for everyone to fend off fatigue, stress, and other structural factors that
could negatively impact creativity and commitment, and to achieve the highest
effectiveness of transformational e-leadership, if they choose to practice it.

On the macro-level, researchers need to further study the impact on organizational
structures and social justice brought by information and communication technology. For
instance, frequent replacement of team members might not affect the interpersonal trust
and organizational commitment, but whether it would be ethical for the labor force and
healthy for the entire society is another subject worthy of studying for social scientists. In
addition, when business outsourcing becomes commonplace and virtual talents are in
both close-by communities and faraway countries, virtual leaders need to deliberate their
corporate social responsibilities when deciding on talent selection.

Limitations and Recommendations

Limitations. One major limitation of this study is that it was conducted in an
American multinational company where English is the prevailing language, and the
average member’s education level is high. Future studies could examine the same
relationships within different cultural contexts, in companies that have different business
models, and in organizations that have heterogeneous demographic backgrounds.

Additionally, no data were collected from those who did not work with virtual
team leaders, and the data excluded the factor that one might work on multiple teams.
Therefore, the comparison of traditional transformational leadership behaviors and
transformational e-leadership behaviors was not possible for this study. Selecting one
team only could also miss the altered perceptions of one’s virtual leader if the respondent
was on more than one team, due to logistic or political reasons. Furthermore, more data and longitudinal studies are needed to confirm the research models from this study, or to create a different research model.

**Future research directions.** A similar study can also be conducted using qualitative methods where rich data can be collected by conducting in-depth interviews of both the virtual team members and team leaders in order to identify more components of transformational e-leadership. For instance, future studies can examine predicting, moderating, or mediating effects of behaviors and factors such as virtual leaders’ technical skills, social competence, and cultural awareness (Hertel et al., 2006).

Virtual team members’ perceptions and characteristics are also important predictor variables to outcomes such as interpersonal trust and organizational commitment (Fausing et al., 2015; Li et al., 2013). Future research can look closer into the differences between highly educated teams and sufficiently educated teams to find out how transformational leadership behaviors work differently within both virtual and traditional business environments.

Although temporal distance per se may not matter as much as some other types of distance (Cummings et al., 2007; Espinosa et al., 2015), cultures may pose various subjective distance, which is likely to predict important outcomes (Siebdrat et al., 2014). Future research can focus on the skills virtual leaders need to acquire to overcome logistical problems, such as communicating and coordinating work across time and space, influencing team members while relying on computer-mediated communication, and monitoring virtual performance while managing external team boundaries (Alistoun & Upfold, 2012; Furst et al., 2004; Rosen et al., 2006).
Future studies also can focus on virtual teams and their interpersonal trust and organizational commitment during the different stages of virtual team development: forming, storming, norming (midpoint), and performing (Furst et al., 2004). Researchers (Kanawattanachai & Yoo, 2007) suggest that early and frequent task-oriented communications from e-leaders play a critical role in forming initial beliefs and establishing the trust of team members. Future research can focus on communications at all stages of virtual team development, and examine and compare the formation of interpersonal trust and organizational commitment during each stage.

In addition, understandings of multi-teaming and its impact on formation of interpersonal trust and organizational commitment are also an important facet of e-leadership (Chudoba et al., 2005). Different e-leaders might influence the same team members in different ways; therefore, it would be interesting to examine the effects of having multiple e-leaders on team members’ organizational commitment. Last but not least, this current study was conducted in a for-profit organization, but e-leadership might be practiced differently in not-for-profit organizations. That can be another venue for future research.

**Conclusions**

This dissertation has presented a quantitative study of e-leadership. The contributions of this study to the field of e-leadership are multifold. It has confirmed that perceived transformational leadership behaviors contributed positively to interpersonal trust and organizational commitment levels within virtual business environments. This study is the first to analyze individual transformational leadership behavior constructs within virtual business environment and one of the first to analyze the functions of the
degree of virtuality. The four constructs of transformational leadership behaviors contributed differently to interpersonal trust and organizational commitment in virtual business environments. Individualized consideration and intellectual stimulation behaviors were found to have statistically significant positive and negative impacts on the outcomes. No statistically important impact was detected for idealized influence and inspirational motivation.

Variety of practices as a construct of the degree of virtuality was both an independent variable and a moderating variable for the relationship between transformational leadership and interpersonal trust within virtual business environments. Virtual team members’ levels of education and age had a statistically significant influence on the confidence in the actions of peers, which is a construct of interpersonal trust. In addition, the virtual team members’ country of work and age range had a statistically significant influence on organizational commitment. And lastly, gender of the virtual leaders, team members’ tenure, and team size had no statistically significant influence on interpersonal trust and organizational commitment.

The modified research models for interpersonal trust and organizational commitment have practical implications for e-leadership practitioners. The concept of transformational e-leadership was proposed due to the different impacts of the four constructs of traditional transformational leadership within virtual business environments. Components of transformational e-leadership include individualized consideration behaviors, behaviors to replace or reverse the impact of intellectual stimulation, behaviors based on the variety of practices, and other unidentified leadership behavior components for trust building and commitment fostering. A future research model for
transformational e-leadership was proposed. The researcher called for more research to verify current research results and to identify transformational e-leadership’s core behavioral components. Implications of transformational e-leadership on social justice were also briefly discussed. Finally, limitations of this study were noted and future research directions were suggested.
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